G.T.N. ARTS COLLEGE SELF FINANCE (AUTONOMOUS)

(Affiliated to Madurai Kamaraj University || Accredited with 'B' Grade by NAAC)

END SEMESTER EXAMINATION - NOVEMBER - 2021

(UNDER OUTCOME BASED EDUCATION (OBE) PATTERN)

Programme : M.Sc. Physics	**Date : 15.02.2022**
Course Code : 20PPHC12	**Time : 10:00 AM - 1:00 PM**
Course Title : Classical Mechanics	**Max. Marks : 60**

Q. No.	SECTION - A (10 * 1 = 10 Marks) Answer ALL Questions	CO(s)	K - Level
1.	_____ is given to a set of independent coordinates sufficient in number to describe completely the state of configuration of a dynamical system. 1.Hamiltonian Dynamics 2.D'Alembert's Principle 3.Lagrange's Dynamics 4.Generalized coordinates	CO1	K1
2.	If the constraints are expressed in the form of equations of the form $f(r_1, r_2,......,t)=0$ then they are called _____. 1.holonomic constraints 2.non-holonomic constraints 3.rigid body 4.momentum	CO1	K2
3.	Planets move in elliptical orbits with the sun at one focus. 1.Law of periods 2.Law of areas 3.Law of orbits 4.Inverse square law	CO2	K1
4.	When $E=(V_{eff})_{min}$, the particle must move in a _____. 1.linear 2.spherical 3.no motion 4.circle	CO2	K2
5.	$[J_y, p_x] =$ _____. 1.0 2.p_y 3.p_z 4.$-p_z$	CO3	K2
6.	The Lagrange's equations of motion for a system is equivalent to _____ equations of motion. 1.Maxwell's 2.Laplace 3.Newton's 4.Poisson	CO3	K2
7.	The energy possessed by a body, for doing work by virtue of its position, is called_____. 1.potential energy 2.kinetic energy 3.electrical energy 4.chemical energy	CO4	K1
8.	A spring having a spring constant k is loaded with a mass m. The spring is cut into two equal parts and one of these is loaded again with the same mass. The new spring constant	CO4	K2

is_____.

1.K/2	2.K
3.2K	4.K^2

9. The statement "If F (q, p, t) and G (q, p, t) are two integrals of motion. Then [F, G] is also   CO5   K1
an integral of motion" is called_____.

1.Legendre's transformations	2.Jacobi-Poisson's theorem
3.Hamilton's principle	4.Relativity theory

10. Calculate the velocity of body if its total energy is three times its rest   CO5   K2
energy_____.

1.0.54c	2.0.76c
3.0.94c	4.c

Q. No.	SECTION - B (5 * 4 = 20 Marks) Answer ALL Questions	CO(s)	K - Level
11. (a)	What is D'Alembert's principle?	CO1	K2
	[OR]		
(b)	What do you mean by cyclic coordinates? Give an example.	CO1	K2
12. (a)	State Bertrand's theorem.	CO2	K3
	[OR]		
(b)	Calculate the reduced mass of CO and HCl molecules.	CO2	K3
13. (a)	Explain the concept of generating functions.	CO3	K1
	[OR]		
(b)	Define Lagrange Brackets.	CO3	K1
14. (a)	How many generalized coordinates are needed to specify the motion of a rigid body?	CO4	K4
	[OR]		
(b)	Describe the principal axes and principal moments of inertia of a rigid body.	CO4	K4
15. (a)	Deduce sommerfield-wilson's rule in relation to action variable.	CO5	K2
	[OR]		
(b)	Describe Lorentz transformation.	CO5	K2

Q. No.	SECTION - C (3 * 10 = 30 Marks) Answer any of 3	CO(s)	K - Level
16.	Derive of Hamilton's equation from a variational principle.	CO1	K2
17.	Examine the Viral theorem.	CO2	K3
18.	Define Poisson's brackets and discuss their properties.	CO3	K2
19.	Derive an expression for the rotational kinetic energy of a rigid body.	CO4	K5
20.	Define Kepler's problem. Find out the solution by Hamilton-Jacobi method.	CO5	K2

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