அரசினர் ஆடவர் கலைக்கல்லூரி (தன்னாட்சி), நந்தனம், சென்னை – **35.**

CODE: **196110** TIME: 3Hrs

NOVEMBER 2020 MAX. MARKS : 50

PART A *(10 x 2=20)*

*Answer any **TEN** questions*

1. Define degrees of freedom.
2. When do you say that a system is non-holonomic?
3. Define ignorable coordinates.
4. Define constants of motion.
5. What do you mean by a stationary value of a function?
6. Define Brachistochrone problem.
7. What is Pfaffian differential form?
8. Define Hamilton principle function.
9. Define momentum transformation.
10. Define Poisson bracket.
11. Give an example for holonomic constraint.
12. Define Kepler problem.

PART B *(2 x5=10)*

*Answer any **TWO** questions*

13. State and prove Konig's theorem.
14. Solve the Kepler's problem by Routhian method.
15. Explain Geodesic problem
16. State and prove Jacobi's theorem.
17. Show that, the transformation $Q = \frac{1}{2}(q^2 + p^2)$ and $P = -tan^{-1}\frac{q}{p}$ is canonical.
18. State and prove the principle of virtual work.
19. Find the stationary values of the function f = z subject to the constraints $\varphi_1 = x^2 + y^2 + z^2 - 4 = 0$ and $\varphi_2 = xy - 1 = 0$
20. Find the differential equation of motion of a spherical pendulum of length 'l'.

PART C *(2x10=20)*

*Answer any **TWO** questions*

21. A particle of mass 'm' is suspended by a massless wire of length r = a + b cos wt (a > b > 0) To form a spherical pendulum. Find the equations of motion,
22. Derive standard form of Lagrange's equations for holonomic system.
23. State and prove the Jacobi form of principle of least action.
24. State and prove the Stackal's thorem.
25. Obtain the four types of generating functions associated with the following transformation $Q = \log\frac{\sin p}{q}$ and $P = q\cot p$.

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