Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHS-11, CLASSICAL MECHANICS
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 1
Maximum CIA marks   : 15

Assignment – 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. What are generalized coordinates? What is the advantage of using them? Consider the motion of a particle of mass *m* moving in space. Selecting the cylindrical co-ordinates (*r, f, z*) as the generalized co-ordinates, calculate the generalized force components if a force **F** acts on it.

2. Define D′ Alembert's principle.Deduce the different mathematical forms of D′ Alembert's principle. Discuss the applications of Lagrangian formulations.

3. Give an introduction to Hamilton's principle and derive the Hamiltonian of the system.

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Programme Name   : M.Sc., Physics
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Assignment No   : 2
Maximum CIA marks : 15

Assignment – 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. What are the Hamilton's canonical equations? What will be the Hamiltonian function of the one-dimensional harmonic oscillator?
2. Discuss Euler's angles as the generalized coordinates for a rigid body motion. Obtain an expression for the angular velocity in terms of Euler's angles.
3. State the Lorentz transformation equations and express them in matrix form. Discuss the expressions for the Lorentz space-time transformations.

Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHS-12, MATHEMATICAL PHYSICS - I
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 1
Maximum CIA marks   : 15

Assignment – 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Explain Green function and Stokes theorem in detail

2. Define rank of a matrix .Show that the rank of a matrix does not alter by pre-multiplication (or post-multiplication) with any non-singular matrix.

3. State and prove Cayley–Hamilton Theorem. verified Cayley-Hamiltonian Theorem for

$$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}. \text{ Find } A^{-1}$$

Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHS-12, MATHEMATICAL PHYSICS - I
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 2
Maximum CIA marks   : 15

Assignment – 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. What is a tensor? Define and explain in detail about contravariant and covariant tensors.

2. State and prove Cauchy's theorem. Discuss polar form of Cauchy-Riemann equations.

3. Show that the set of subsets of a set with the union composition is a semi-group. Show that the order of any element of a group is always equal to the order of its inverse.

Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHS-13, LINEAR AND INTEGRATED ELECTRONICS
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 1
Maximum CIA marks   : 15

Assignment – 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Explain Schottky diode in detail

2. State and explain between Thevenin and Norton theorems? What are the limitations of Thevenin's theorem? Can we convert Norton to Thevenin?

3. Explain in detail Inverting and Non-Verting amplifier

Programme Code No	2181
Programme Name	: M.Sc., Physics
Course Code & Name	: MPHS-12, MATHEMATICAL PHYSICS - I
Batch	: AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No	: 2
Maximum CIA marks	: 15

Assignment – 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. What is semiconductor memory and classify them? What is static shift register? Why do we need shift registers?

2. Write the principle of coupled device CCD? How does a CCD work? What is the CCD device and how it works to transfer the electric charge?

3. Draw and Explain Digital to Analog Converter, its Types and 3 Applications, Advantages, and Disadvantages of Digital to Analog Converters

Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHSEL-01, NUMERICAL METHODS
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 1
Maximum CIA marks   : 15

Assignment – 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Deduce Newton-Gregory forward interpolation formula. Using Newton's forward interpolation, find the pressure at the temperature of 142 °C from the following table

Temp °C	140	150	160	170	180
Kg/cm^2	3.685	4.854	6.302	8.076	10.225

2. Find the root of the equation $x^3 - 4x - 9 = 0$ and correct to four decimal places by using the bisection method.

3. Deduce Newton Raphson method. Find a root of the given equation $f(x) = x^3 - x - 1$ using Newton Raphson method.

Programme Code No   2181
Programme Name   : M.Sc., Physics
Course Code & Name   : MPHSEL-01, NUMERICAL METHODS
Batch   : AY 2023-2024 (Ist YEAR - I SEMESTER)
Assignment No   : 2
Maximum CIA marks   : 15

Assignment – 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Solve the following equations by the Gauss elimination method:

    (i).   5x –y – 2z = 142   (ii).   3x – y + 2z = 12

    x – 3y – z = -30   x + 2y + 3z = 11

    2x – y – 3z = 5   2 x – 2y – z = 2

2. Calculate the approximate value of $\int_{-3}^{3} x^4 \, dx$ by (i) Trapezoidal rule and (ii) Simpson's 1/3 rule by taking seven equidistant ordinates and compare your results.

3. Explain Runge-kutta method of error analysis.Using fourth order Runge-Kutta method, find the solution of $\frac{dy}{dx} = x + x^2 y$ at $x = 0.1$ with the initial conditions $x_0 = 0, y_0 = 1$