



TAMIL NADU OPEN UNIVERSITY
Chennai - 15
Department of Physics
School of Sciences

HOME / SPOT ASSIGNMENT

Programme Code No	: 281
Programme Name	: M.Sc., Physics
Course Code & Name	: MPHS-11, CLASSICAL MECHANICS
Batch	: AY 2021-2022 (1 st YEAR - I SEMESTER)
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignments)

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, ϕ, z) as the generalized co-ordinates, calculate the generalized force components if a force \mathbf{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.

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.



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Programme Code No	: 281
Programme Name	: M.Sc., Physics
Course Code & Name	: MPHS-12, MATHEMATICAL PHYSICS - I
Batch	: AY 2021-2022 (1 st YEAR - I SEMESTER)
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignments)

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

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

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.



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HOME / SPOT ASSIGNMENT

Programme Code No : 281
Programme Name : M.Sc., Physics
Course Code & Name : MPHS-13, LINEAR AND INTEGRATED CIRCUITS
Batch : AY 2021-2022 (1st YEAR - I SEMESTER)
No. of Assignment : One Assignment for Each 2 Credits
Maximum CIA marks : 15 (Average of Total No. of Assignments)

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-Inverting amplifier

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



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Programme Code No	: 281
Programme Name	: M.Sc., Physics
Course Code & Name	: MPHS-21, MATHEMATICAL PHYSICS - II
Batch	: AY 2021-2022 (1 st YEAR - II SEMESTER)
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignments)

ASSIGNMENT - 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Find the interval of convergence of the series

$$\sum_{n=0}^{\infty} nX^n$$

2. Define Beta and Gamma Function. Derive the Relation between Beta and Gamma functions and explain the properties of beta function.
3. Drive Bessel's function of the first kind of order n from Bessel's differential equation. Discuss generating function for Bessel's function and Explain recurrence relation for Bessel's function.

ASSIGNMENT - 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Derive Rodrigue's formula for Hermite polynomials. Calculate Hermite polynomials of various degrees with the help of Rodrigue's formula and Show that $H_n(x)$ is a solution for Hermite equation.

2. A rod of length 'l' has its ends A and B kept $0^{\circ}c$ and $100^{\circ}c$ respectively until steady state condition prevail. If the temperature at B is reduced suddenly to $0^{\circ}c$ and kept so while that of A is maintained, find the temperature $u(x,t)$ at a distance x from A and at time t.
3. Find the Fourier Transform of

$$f(x) = \begin{cases} 1 - |x| & \text{if } |x| < 1 \\ 0 & \text{if } |x| > 1 \end{cases}$$

Hence deduce that $\int_0^{\infty} \left(\frac{\sin t}{t}\right)^4 dt = \frac{\pi}{3}$.



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Programme Code No	: 281
Programme Name	: M.Sc., Physics
Course Code & Name	: MPHS-22, QUANTUM MECHANICS - I
Batch	: AY 2021-2022 (1 st YEAR - II SEMESTER)
No.of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignments)

ASSIGNMENT - 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Derive the time-dependent Schrödinger equation for a particle moving in a force field. What is the significance of time independent Schrödinger equation?
2. Write a detailed note on one-dimensional potential barrier. Discuss about the alpha-particle emission giving appropriate examples.
3. Explain the concept of particle in a box.

ASSIGNMENT - 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Briefly discuss about Hilbert's space and Obtain the equation of motion in Heisenberg's picture.
2. Explain how the ground state energy could be evaluated using the variation method and hence find the ground state energy of helium atom.
3. Discuss W.K.B. Approximation. Explain the main stages involved in the WKB approximation. Use the technique to obtain the asymptotic solution of the one dimensional Schrödinger equation. Also arrive at the solution near a turning point.



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Programme Code No : 281
Programme Name : M.Sc., Physics
Course Code & Name : MPHS-23, ELECTROMAGNETIC THEORY
Batch : AY 2021-2022 (1st YEAR - II SEMESTER)
No. of Assignment : One Assignment for Each 2 Credits
Maximum CIA marks : 15 (Average of Total No. of Assignments)

ASSIGNMENT - 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Derive Poisson's and Laplace equation and Derive an expression for Energy associated to an electrostatic field.
2. Derive an expression for Amphere's law in magnetized material.
3. Derive Maxwell's equations and their physical significance

ASSIGNMENT - 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. State and Prove Poynting theorem
2. Define reflection coefficient and derive the relation of Transmission coefficient between two nonconducting media.
3. Derive an equation for rectangular wave guide and Explain total internal reflection and critical angle.



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HOME / SPOT ASSIGNMENT

Programme Code No : 281
Programme Name : M.Sc., Physics
Course Code & Name : MPHSEL-1, NUMERICAL METHODS
Batch : AY 2021-2022 (1st YEAR - I SEMESTER)
No. of Assignment : One Assignment for Each 2 Credits
Maximum CIA marks : 15 (Average of Total No. of Assignments)

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.

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). $5x - y - 2z = 142$

$$x - 3y - z = -30$$

$$2x - y - 3z = 5$$

(ii). $3x - y + 2z = 12$

$$x + 2y + 3z = 11$$

$$2x - 2y - z = 2$$

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 $\frac{dy}{dx} = x + x^2y$ at $x = 0.1$ with the initial conditions $x_0 = 0, y_0 = 1$



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Programme Code No : 281
Programme Name : M.Sc., Physics
Course Code & Name : MPHSEL-2, MICRO PROCESSOR AND MICRO CONTROLLER
Batch : AY 2021-2022 (1st YEAR - II SEMESTER)
No.of Assignment : One Assignment for Each 2 Credits
Maximum CIA marks : 15 (Average of Total No. of Assignments)

ASSIGNMENT - 1

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Explain with a neat block diagram the architecture of 8085 microprocessor and Write about the pin configuration of 8085 processor and explain them in detail.
2. Describe with suitable examples the data transfer instructions in 8085 microprocessor and Write an 8085 assembly language program to sort numbers ascending orders.
3. Describe Intel 8086 Microprocessor Architecture and Describe any five addressing modes of 8086 with suitable examples

ASSIGNMENT - 2

Max : 15 marks

Answer any one of the question not exceeding 1000 words

1. Draw a neat block diagram the architecture of 8051 microcontroller and explain about interrupts used in 8051 microcontroller.
2. Explain the operation of 8255 PPI Port A programmed as input and output in mode 1 with necessary handshaking signals and Explain the parallel communication between two processors using mode 2 of 8255.
3. With functional block diagram, explain the operation and programming of 8251 USART in detail.