



# TAMIL NADU OPEN UNIVERSITY

Chennai - 15

School of Sciences

Department of Physics

## HOME / SPOT ASSIGNMENT

Programme Code No	: 281
Programme Name	: M. S.c., Physics
Course Code & Name	: MPHY-21, Quantum Mechanics
Batch	: AY 2020 -21 - II Year
No.of Assignments	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignment)

### ASSIGNMENT -I

Answer any one of the questions not exceeding 1000 words

1. Briefly discuss about Hilbert's space and Obtain the equation of motion in Heisenberg's picture.
2. 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.
3. Obtain the expressions for the first order corrections to the energy and wave function making the use of the non-degenerate stationary perturbation theory.

### ASSIGNMENT -II

Answer any one of the questions not exceeding 1000 words

1. Explain how the ground state energy could be evaluated using the variation method and hence find the ground state energy of helium atom.
2. What are C.G. Coefficient? Explain their significance in detail.
3. Deduce relativistic Klein Gordon equation. Can we use this equation for pions and kaons. Show that its probability expression is indefinite.

### ASSIGNMENT -III

Answer any one of the questions not exceeding 1000 words

1. Derive an expression electron magnetic moment and Obtain the relations between scattering cross section and scattering amplitude.
2. Explain the central field approximation method in detail
3. Obtain the Lagrangian equations of motion.



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Programme Code No	: 281
Programme Name	: M. S.c., Physics
Course Code & Name	: MPHY-22, Condensed Matter Physics
Batch	: AY 2020 -21 – II Year
No.of Assignments	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignment)

**ASSIGNMENT -I**

Answer any one of the questions not exceeding 1000 words

1. Explain in detail - Kronig Penny Model.
2. Discuss in detail Free electron gas model in three dimension.
3. Explain unit cell and Lattice parameter of an unit cell and Derive the reciprocal lattice to FCC lattice

**ASSIGNMENT -II**

Answer any one of the questions not exceeding 1000 words

1. Explain BCS theory of superconductors and Discuss in detail about properties of superconductor.
2. Explain Type 1 and Type 2 super conductors and Discuss flux quantization in a superconductivity ring.
3. Derive London equation of superconductor and Discuss in detail about DC and AC Josephson effects

**ASSIGNMENT -III**

Answer any one of the questions not exceeding 1000 words

1. Explain Landau theory of Phase transition in ferroelectric materials and Explain Langevin diamagnetism theory in detail
2. What is Local or Internal field? Deduce the Clausius-Mossotti relation for a dielectric material.
3. Discuss the domain structure in ferromagnetic materials. Show how the hysteresis curve is explained on the basis of domain theory.



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Programme Code No	: 281
Programme Name	: M. S.c., Physics
Course Code & Name	: MPHY-23, Spectroscopy
Batch	: AY 2020 -21 – II Year
No.of Assignments	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignment)

### ASSIGNMENT -I

Answer any one of the questions not exceeding 1000 words

1. Explain Energy levels in alkali spectra and quantum effect. Discuss salient features of alkali spectra.
2. Derive an expression for Lande G factor and Explain hyperfine structure of spectral lines.
3. Derive an expression for rotational spectra of rigid diatomic molecules.

### ASSIGNMENT -II

Answer any one of the questions not exceeding 1000 words

1. Explain Diatomic vibration rotator and Discuss about Fourier Transform Infrared Spectroscopy.
2. Explain the construction and working of Raman Spectrometer. What is Hyper Raman effect? Explain classical Hyper raman effect and its experimental technique.
3. With a neat sketch, explain in detail about Rotation–vibration spectra of polyatomic molecules

### ASSIGNMENT -III

Answer any one of the questions not exceeding 1000 words

1. Explain Resonance condition in NMR. Explain the Quadrupole nucleus.
2. Explain Fine and Hyperfine structure of ESR spectroscopy. Explain the construction and working of ESR spectrometer.
3. Explain Recoilless absorption and emission of Mossbauer Spectroscopy



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Programme Code No	: 281
Programme Name	: M. S.c., Physics
Course Code & Name	: MPHY-24, LASER and Fiber Optics
Batch	: AY 2020 -21 - II Year
No.of Assignments	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignment)

### ASSIGNMENT -I

Answer any one of the questions not exceeding 1000 words

1. Explain the construction and working of Ruby laser and Explain the applications of laser.
2. Explain Modes of a rectangular cavity. Discuss in detail about Threshold condition.
3. Discuss Semiconductor laser Discuss in detail CO2 laser.

### ASSIGNMENT -II

Answer any one of the questions not exceeding 1000 words

1. Discuss in detail about Theory of optical activity and optical activity in quartz.
2. Discuss the principle of Optical fiber and Derive an expression for Numerical aperture and acceptance angle of optical fiber.
3. Discuss classification of optical fibers. Discuss the term in Dispersion in optical fiber in detail. Explain the applications of optical fiber.

### ASSIGNMENT -III

Answer any one of the questions not exceeding 1000 words

1. Explain with neat sketch, homogeneous and heterogeneous LEDs and Explain the working of LED and advantage and disadvantage of LED.
2. What is Plasma? Explain plasma display and its merits and demerits
3. Discuss Photoluminescence. Discuss in detail about liquid crystal and LCD.



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Programme Code No	: 281
Programme Name	: M. S.c., Physics
Course Code & Name	: MPHY-25, Numerical Methods
Batch	: AY 2020 -21 – II Year
No.of Assignments	: One Assignment for Each 2 Credits
Maximum CIA marks	: 15 (Average of Total No. of Assignment)

**ASSIGNMENT -I**

Answer any one of the questions not exceeding 1000 words

1. Explain Bisection method. And Find the root of the equation  $x^3 - x - 1 = 0$  correct to two decimal places by bisection method.
2. Explain Iteration method. Find the root of the equation  $x^3 + x^2 - 1 = 0$  by iteration method correct to two decimal places.
3. Explain Gauss – Seidel Iterative Method and Solve the system of equations  $4x + 2y + z = 14$ ,  $x + 5y - z = 10$ ,  $x + y + 8z = 20$  using Gauss – Seidel iteration method.

**ASSIGNMENT -II**

Answer any one of the questions not exceeding 1000 words

1. Deduce Newton – Gregory Formula for Backward Interpolation.
2. Deduce Newton's forward difference formula to find numerical differentiation.
3. Explain Newton-cote's formula for Numerical Integration and Trapezoidal rule

**ASSIGNMENT -III**

Answer any one of the questions not exceeding 1000 words

1. Evaluate  $I = \int_0^6 \frac{dx}{(1+x)}$  using (1) Trapezoidal rule (2) Simpson's rule. Verify your results by actual integration.
2. Explain Solution of first order differential equations – Taylor series method and Solve the initial value problem  $dx/dy = x^2 - y$  with the initial condition  $y(0)=1$  by Taylor series method and find  $y(0.1)$  and  $y(0.2)$ .
3. Discuss Euler's Method and Solve the initial value problem  $y' = -y$  with the

initial condition  $y(0)=1$  by Euler's method , improved Euler's method and modified Euler's method. And find the value of  $y(0.01)$