

ASSIGNMENT - 1, DEC - 2016.  
M.Sc. (PREVIOUS) FIRST YEAR DEGREE  
PHYSICS  
PAPER- I : MATHEMATICAL PHYSICS

Maximum : 30 MARKS  
Answer ALL questions.

- 1) a) Write the Hermite's equation and find its solution.  
b) Derive the generating function for the Hermite's polynomials.
- 2) a) Write the Legendre's differential equation and find its solution.  
b) To prove the Legendre's recurrence relation  $x P_l'(x) - P_{l-1}'(x) = l P_l(x)$
- 3) Find the necessary and sufficient condition for  $F(z)$  to be analytic.
- 4) a) State and prove Taylor theorem.  
b) Evaluate the Integral  $\int_0^{2\pi} \frac{d\theta}{5 - 3\cos\theta}$
- 5) Answer the following:
  - a) Derive the generating function for the Bessel functions.
  - b) Laurent's theorem.

-----

ASSIGNMENT - 2, DEC - 2016.  
M.Sc. (PREVIOUS) FIRST YEAR DEGREE  
PHYSICS

PAPER- I : MATHEMATICAL PHYSICS

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) What are the symmetric and antisymmetric tensors? Explain.  
b) Discuss the algebraic operations on Cartesian tensors.
- 2) a) What are the special Cartesian tensors? Explain.  
b) Discuss on associated tensors.

3) Find the Fourier transform of

$$f(x) = \begin{cases} 1-x^2 & \text{if } |x| \leq 1 \\ 0 & \text{if } |x| > 1 \end{cases}$$

and use it to evaluate  $\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} \cos\left(\frac{x}{2}\right) dx$

- 4) a) State and prove first and second shifting theorems.  
b) Find the Laplace transform of  $\cos^2 t$ .
- 5) Answer the following:  
a) Tensors in elasticity.  
b) Find the Fourier transform of the function.

$$f(x) = \begin{cases} t, & \text{for } |t| < a \\ 0 & \text{for } |t| > a \end{cases}$$

-----

ASSIGNMENT - 1, DEC - 2016.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

PHYSICS

PAPER- II : CLASSICAL MECHANICS AND STATISTICAL MECHANICS

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) State and explain D'Alembert's principle and principle of least action.  
b) Derive the Lagrangian equation from Hamilton principle.
  
- 2) a) Write about angular momentum and kinetic energy of a rigid body.  
b) Obtain Euler equations of motion to rigid body.
  
- 3) a) Obtain the Lagrangian formulations of relativistic mechanics.  
b) Explain Lagrangian and Poisson brackets with examples.
  
- 4) a) Obtain Hamilton- Jacobi equations from Hamilton's principle.  
b) Deduce the relations of action –angle variables.
  
- 5) Write notes on the following.
  - a) Principle of virtual work
  - b) Liouville's Theorem

-----

ASSIGNMENT - 2, DEC - 2016.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

PHYSICS

PAPER- II : CLASSICAL MECHANICS AND STATISTICAL MECHANICS

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) State and explain the Boltzmann equipartition theorem.  
b) Distinguish between microcanonical, canonical and grand canonical ensembles.
- 2) a) What is Gibbs' paradox. How it can be resolved.  
b) Discuss rotational partition function.
- 3) What is partition function. Obtain its value for an ideal mono atomic gas by using microcanonical ensemble.
- 4) a) Derive the distribution law for Maxwell –Boltzmann and Bose-Einstein statistics.  
b) Write about Bose –Einstein condensation.
- 5) Write notes on the following.
  - a) Theory of small oscillation
  - b) Theory of white dwarfs.

-----

ASSIGNMENT - 1, DEC - 2016.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

PHYSICS

PAPER- III : QUANTUM MECHANICS

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) State and explain postulates of quantum mechanics.  
b) Describe Dirac's bra and ket notations. State and explain Ehrenfest theorem.
  - 2) a) Obtain the solution of wave equation in one dimension for a particle moving in a constant potential field with finite walls.  
b) Obtain Eigen values and eigen functions for simple harmonic oscillator.
  - 3) a) Solve the problem of normal helium atom by time independent perturbation theory.  
b) Write about general perturbation theory.
  - 4) a) Distinguish between time independent perturbation theory and time dependent perturbation theory.  
b) What are transition states. Write about Einstein transition probabilities.
-

ASSIGNMENT - 2, DEC - 2016.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

PHYSICS

PAPER- III : QUANTUM MECHANICS

Maximum : 30 MARKS

Answer ALL questions.

- 1)
    - a) Obtain eigen values and eigen functions to  $L^2$  and  $L_z$ .
    - b) Discuss spin angular momentum and obtain Pauli spin matrices.
  
  - 2)
    - a) Obtain matrices for  $J_x$ ,  $J_y$  and  $J_z$ .
    - b) Describe the theory of Clebsch Gordon coefficients in addition of angular momentum.
  
  - 3)
    - a) Obtain the equation of motion in Schrodinger's picture.
    - b) Discuss the correspondence between Schrodinger and Heisenberg picture with classical mechanics.
  
  - 4) Write a note on any TWO of the following.
    - a) Ortho normality of eigen functions.
    - b) Stark effect in hydrogen atom.
    - c) Probability and current density
    - d) Write about negative energy states and spin of electron
-

**ASSIGNMENT - 1, DEC - 2016.**

**M.Sc. (PREVIOUS) FIRST YEAR DEGREE**

**PHYSICS**

**PAPER- IV : ELECTRONICS**

**Maximum : 30 MARKS**

**Answer ALL questions.**

- 1) a) What is an OP-Amp? Explain the working of a differential amplifier.  
b) What is the principle of oscillator? Explain the working of Wien- bridge oscillator.
  - 2) a) Explain the effect of negative feedback in an OP-Amp.  
b) How an OP-Amp used as inverting and non-inverting amplifier.
  - 3) a) What is mean by transit time effect? Explain the working of travelling wave tube.  
b) What are the factors that effect the gain of travelling wave tube?
  - 4) a) What is frequency modulation? Discuss the generation of FM waves.  
b) Explain the principles of working of super heterodyne receiver.
  - 5) Write short notes on the following:
    - a) Differential amplifier.
    - b) Klystron oscillator.
-

ASSIGNMENT - 2, DEC - 2016.

M.Sc. (PREVIOUS) FIRST YEAR DEGREE

PHYSICS

PAPER- IV : ELECTRONICS

Maximum : 30 MARKS

Answer ALL questions.

- 1) a) What is decoder? Explain its working.  
b) Discuss the working of JK master slave flip-flop.
  - 2) a) What is an A/D conversion? Explain the operation of counter type A/D converter.  
b) Explain the working of R-2R ladder D/A converter.
  - 3) a) What are the addressing modes in 8085 microprocessor? Explain.  
b) Where are symbols used in flow chart? Explain.
  - 4) a) Classify the instruction set of 8085  $\mu$ p. Explain them.  
b) What is looping? Explain its purpose.
  - 5) Write short notes on the following:
    - a) Multiplexer / Data selection.
    - b) 8085  $\mu$ p Architecture.
-