

**Dr. B.R. Ambedkar Open University**  
**M.Sc I year - PHYSICS (2017-18)**  
**Course -1: Mathematical Physics and Classical Mechanics**  
**ASSIGNMENT-1**

Maximum Marks: 15  
Minimum Marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. Find the solution of the Laplace's equation in Cartesian coordinate system.
2. State and prove the frequency shifting property in Fourier Transforms.

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. Starting from the fundamental differential equation derive the Bessel's differential equation of first kind
2. Explain summation convention and define Kronecker delta function.

**Dr. B.R. Ambedkar Open University**  
**M.Sc I year - PHYSICS (2017-18)**  
**Course -1: Mathematical Physics and Classical Mechanics**  
**ASSIGNMENT-II**

Maximum Marks: 15  
Minimum marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. Describe the use of Rayleigh dissipation function.
2. Explain the technique involved in numerical integration

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. Give an account of the Hamiltonian-Jacobi theory and apply it to solve the harmonic oscillator problem.
2. Solve  $\cos x = x$  using the bisection method.

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -II: Statistical Mechanics and Quantum Mechanics**  
**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. Define an Ensemble. Using this concept arrive at an expression for probability density.
2. Draw the comparison table of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. State and prove Wigner-E cart theorem
2. Write Eigen values and Eigen functions of Hydrogen atom.

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -II: Statistical Mechanics and Quantum Mechanics**  
**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. Explain briefly the principle of time independent perturbation theory
2. What are negative energy states? Discuss.

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. Explain how Klein Gordon equation leads to positive and negative probability density values.
2. Explain time dependent perturbation theory.

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -III: Solid State Physics**  
**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A** (Marks: 05)

**I. Answer any one of the following questions in about 10 lines.**

1. Explain the Bragg's law of x-ray diffraction
2. State and explain the first Fick's law of diffusion

**Section-B** (Marks: 10)

**II. Answer any one of the following questions in about 30 lines**

1. Explain the formation of Laue spots. What information can be obtained from the Laue spots. Explain how a Laue photograph is indexed.
2. Explain the Debye's theory of specific heats. What are its successes and failures?

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -III: Solid State Physics**  
**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A** (Marks: 05)

**I. Answer any one of the following questions in about 10 lines.**

1. What is infrared absorption? Discuss.
2. Distinguish between the dia, Para, and ferromagnetic materials.

**Section-B** (Marks: 10)

**II. Answer any one of the following questions in about 30 lines**

1. What is ionic polarization? How is it different from electronic polarization?
2. What are high temperature superconductors? Discuss the applications of superconductors.

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -IV: Semiconductor Devices: Analog and Digital Electronics**  
**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. What are Solar Cells? Explain the characteristics and applications of Solar Cells.
2. Distinguish between inverting and non-inverting Op-Amps?

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. Draw the circuit diagram of half wave rectifier and explain its working.
2. Draw the circuit diagram of an Op-Amp differentiator and explain its working. Write a note on the differentiator stability.

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**M.Sc I year - PHYSICS (2017-18)**  
**Course -IV: Semiconductor Devices: Analog and Digital Electronics**  
**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A (Marks: 05)**

**I. Answer any one of the following questions in about 10 lines.**

1. Draw the circuit diagram of half-adder and explain its working along with truth table.
2. What is the difference between Resolution and accuracy?

**Section-B (Marks: 10)**

**II. Answer any one of the following questions in about 30 lines**

1. Draw the logic circuit of JK flip-flop using SR flip-flop and explain its operation.
2. Describe the operation of a successive approximation counter technique.