

**DR.B.R.Ambedkar Open University**

**M.Sc First Year - PHYSICS (2022-23)**

**Course -1: Mathematical Physics and Classical Mechanics**

**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks:10)**

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

1. Where can you use convolution theorem in Laplace Transform
2. Explain the difference between the inner product of two tensors and the contraction of a tensor

**Section-B**

**(Marks-05)**

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

1. Write the theorem of Generating function of Hermite polynomials.
2. State and write D'Alembert's principle.

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -1: Mathematical Physics and Classical Mechanics**

**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks:10)**

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

1. Derive Lagrange's equation of motion using D'Alembert's principle for conservative holonomic system
2. Derive Newton's formula for forward interpolation and explain the assumptions for its validity.

**Section- B**

**(Marks:05)**

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

1. Explain the principle of virtual work
2. Explain the technique involved in numerical integration

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -II: Statistical Mechanics and Quantum Mechanics**

**ASSIGNMENT- I**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks:10)**

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

1. Explain the Maxwell-Boltzmann statistics with suitable examples.
2. State and prove Liouville's theorem.

**Section-B**

**(Marks:05)**

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

1. Explain Stark effect in Hydrogen atom.
2. What are the inadequacies of Klein Gordon equation.

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**Course -II: Statistical Mechanics and Quantum Mechanics**

**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks:10)**

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

1. Formulate the Schrodinger equation for Hydrogen atom and separate the angular and radial parts.
2. Derive eigen values and eigen functions of  $L^2$ .

**Section-B**

**(Marks:05)**

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

1. State and prove the properties of Pauli's spin matrices.
2. State the conditions for thermal and mechanical equilibrium

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -III: Solid State Physics**

**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks:10)**

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

1. What is Crystal structure? With the help of neat diagram.
2. Explain the principle of Debye-Scherrer method of X-ray diffraction.

**Section-B**

**(Marks :05)**

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

1. What are Phonons? Write their important properties.
2. Explain Type-I and Type II super conductors.

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -III: Solid State Physics**

**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks :10)**

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

1. Explain the Debye's theory of specific heats. What are its successes and failures?
2. State and explain Fick's laws of diffusion.

**Section-B**

**(Marks:05)**

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

1. Discuss the Weiss theory of Ferromagnetism.
2. Explain the main assumption of Sommerfield quantum theory of free electrons.

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -IV: Semiconductor Devices: Analog and Digital Electronics**

**ASSIGNMENT-I**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks :10)**

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

1. Draw a neat circuit diagram of Phase shift oscillator and explain the theory with circuit operation.
2. Explain along with the circuit diagram, mod-7 counter

**Section-B**

**(Marks: 05)**

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

1. Draw the circuit diagram of a basic comparator and explain its working
2. How the Op-Amp is used as a Differentiator?

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**M.Sc First Year - PHYSICS (2022-23)**

**Course -IV: Semiconductor Devices: Analog and Digital Electronics**

**ASSIGNMENT-II**

Maximum Marks: 15

Minimum marks: 06

**Section-A**

**(Marks :10)**

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

1. How does flash A/D converter Operate. Explain.
2. Explain the operation of RS and JK flip flops along with their truth tables.

**Section-B**

**(Marks :05)**

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

1. Explain different types of logic gates along with their truth table and state De Morgan's theorems.
2. What is X-OR gate? Explain along with truth table