

DR.B.R.Ambedkar Open University

M.Sc First Year - PHYSICS (2020-21)

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. Find the solution of the Laplace's equation in Spherical polar coordinate system.
2. Explain Hamiltons and Jacobi theorem? How this theorem is used to understand the harmonic oscillator.

Section-B

(Marks-05)

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

- 1.State and write D'Alembert's principle.
2. Where can you use convolution theorem in Laplace Transform

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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 Bisection method.
2. What are constraints? Explain the principle of virtual work.

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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. Define and explain the B-E statistics and arrive at the distribution function.

Section-B

(Marks:05)

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

1. State and explain Liouville's theorem
2. Explain eigen functions and eigen vectors

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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 Hydrozen atom and separate the angular and radial parts.
2. Explain Fermi Gorden rule.

Section-B (Marks:05)

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

1. State and Prove the Uncertainty Principle.
2. Distinguish in detail between the three types of ensembles.

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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. Distinguish between crystalline and non crystalline solids. Explain the glass characterizing properties.
2. Explain the theory of Paramagnetism. Obtain an expression for magnetic susceptibility of a Paramagnetic substance.

Section-B

(Marks :05)

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

1. What factors determine the intensity of reflections in powder method?
2. Explain the Bragg's Law of X-ray diffraction.

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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. What are phonons? Write the important properties of phonons.

Section-B

(Marks:05)

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

1. Give the experimental method for verification of dispersion curve
2. Explain Curie Weiss law for paramagnetic materials

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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 the Open loop and closed loop gains of an Op-Amp

Section-B

(Marks: 05)

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

1. Discuss about Digital to Analog converters.
2. How the Op-Amp is used as a Differentiator?

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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. Draw the circuit diagram of all logic gates and explain the action of each gate along with its truth table.
2. What is X-OR gate? Explain along with truth table

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Course V: Nuclear Physics & Analytical Techniques

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 significance of magic numbers and discuss prediction of the nuclear shell model.
2. Derive Bohr's formula for ionization due to passage of heavy charged particles in the medium.

Section-B

(Marks: 05)

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

1. What are Fermi-Curie plots? Discuss their importance
2. Explain the theory of pair production.

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Course V: Nuclear Physics & Analytical Techniques

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 Bloch equations and explain their significance.
2. With a neat sketch , explain the functioning of different parts of SEM

Section-B

(Marks: 05)

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

1. Discuss the principle of electron microscopy and give their applications.
2. Define and explain the magnetic susceptibility and permeability of materials.

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Course VI: Electromagnetic Theory and Spectroscopy

ASSIGNMENT-I

Maximum Marks: 15

Minimum marks: 06

Section-A

(Marks:10)

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

1. State and explain Faraday's and Lenz's laws. Obtain expressions for self and mutual inductance.
2. Explain L-S coupling. Derive the spectral terms for Calcium($z=20$) arising the configurations (i)two equivalent s electrons (ii) one s and one p electrons

Section-B

(Marks :05)

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

1. Write the Maxwell equations for charge and current free regions of matter.
2. Explain the classical and Quantum theory of Raman effect

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Course VI: Electromagnetic Theory and Spectroscopy

ASSIGNMENT-II

Maximum Marks: 15

Minimum marks: 06

Section-A

(Marks:10)

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

1. Discuss the Rotational fine structure of electronic spectra and explain Fortrat parabola.
2. Describe intensity distribution of electronic spectral lines using Frank Condon principle.

Section-B

(Marks:05)

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

1. Outline the effect of isotopic substance on the rotational spectra of molecules
2. What is hyperfine splitting of Spectra?

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Course VII: Memory Devices and Microprocessors

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 are the various status flags in 8085 microprocessor? Explain the functions of the flags
2. Write an Assembly language programme to find the sum of two decimal numbers

Section-B

(Marks:05)

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

1. Discuss and compare RTL, DTL and TTL logic gates.
2. Explain memory organization of 8155 RAM with a block diagram.

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Course VII: Memory Devices and Microprocessors

ASSIGNMENT-II

Maximum Marks: 15

Minimum marks: 06

Section-A

(Marks:10)

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

1. Give the salient features of PIC 8259 and explain the function of all the signals using the pin diagram.
2. Compare and contrast between memory mapped I/O and isolated I/O

Section-B

(Marks :05)

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

1. Explain the architecture of Pentium processor.
2. Explain the following instructions with examples:
a) Loop b) MOVSB c) REP label prefix d) XCHG

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Course VIII: Microwave Devices and Communication Systems

ASSIGNMENT-I

Maximum Marks: 15

Minimum marks: 06

Section-A

(Marks:10)

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

1. Discuss the propagation of TM waves in a rectangular wave guide.
2. Draw the block diagram of CW radar and explain its working.

Section-B

(Marks:05)

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

1. Discuss about reflection in a parallel plane wave guide
2. Explain the principle of square law detector.

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Course VIII: Microwave Devices and Communication Systems

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 working of a basic Radar Equation
2. Describe the construction and working of helix travelling wave tube.

Section-B (Marks:05)

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

1. Discuss the generation of Frequency Modulation
2. Explain the terms (i) Gain, 2) Efficiency,3)Radiation resistance of an antenna.