PHY110R(MDC)

Student's Copy

2025

(NEP-2020)

(2nd Semester)

PHYSICS

(Multi-disciplinary Course)

(Physics for All)

(Revised)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A-OBJECTIVE)

(Marks: 10)

Tick (\checkmark) the correct answer in the brackets provided : $1 \times 10 = 10$

- 1. Which statement best describes the heliocentric model of our solar system?
 - (a) The earth is located at the centre of the model. ()
 - (b) The sun is located at the centre of the model. ()
 - (c) All planets except the earth revolve around the sun. ()
 - (d) None of the above ()
- 2. Retrograde motion of a planet means that
 - (a) it spins backward around its axis, compared to all other planets ()
 - (b) it appears to be moving backward on the celestial sphere, as viewed from earth
 ()
 - (c) it always moves in the sky in the opposite direction to all other planets
 - (d) it is gradually moving away from the sun, in an orbit that spirals slowly outward ()

)

| з. | Wh | o proposed the geocentric model of the universe? | | | | | | | | | |
|----|------|--|--|--|--|--|--|--|--|--|--|
| | (a) | Aristotle () (b) Copernicus () | | | | | | | | | |
| | (c) | Claudius Ptolemy () (d) Galileo () | | | | | | | | | |
| 4. | Wh | Which of the following is a dwarf planet? | | | | | | | | | |
| | (a) | Mercury () (b) Venus () | | | | | | | | | |
| | (c) | Earth () (d) Pluto () | | | | | | | | | |
| 5. | Wh | at event marks the beginning of the universe according to the Big Bang | | | | | | | | | |
| | The | eory? | | | | | | | | | |
| | (a) | Formation of the first star () | | | | | | | | | |
| | (b) | Creation of light elements () | | | | | | | | | |
| | (c) | The initial singularity () | | | | | | | | | |
| | (d) | Expansion of the universe into its current state () | | | | | | | | | |
| 6. | Wh | nat key evidence supports the Big Bang Theory? | | | | | | | | | |
| | (a) | The presence of dark matter () | | | | | | | | | |
| | (b) | Cosmic microwave background radiation () | | | | | | | | | |
| | (c) | The distribution of galaxies () | | | | | | | | | |
| | (d) | The rotation curves of galaxies () | | | | | | | | | |
| 7. | Wh | o first proposed the Many-Worlds Interpretation? | | | | | | | | | |
| | (a) | Niels Bohr () (b) Albert Einstein () | | | | | | | | | |
| | (c) | Hugh Everett III () (d) Erwin Schrödinger () | | | | | | | | | |
| 8. | The | fine-tuning argument is often used in discussion related to | | | | | | | | | |
| | (a) | the multiverse theory () (b) the theory of relativity () | | | | | | | | | |
| | (c) | string theory () (d) classical mechanics () | | | | | | | | | |
| 9. | What | at is the basic idea of the multiverse theory? | | | | | | | | | |
| | (a) | Parallel universes do not exist () | | | | | | | | | |
| | (b) | There are multiple, possibly infinite, universes that exist | | | | | | | | | |
| | | simultaneously () | | | | | | | | | |
| | (c) | The universe is infinite and unchanging () | | | | | | | | | |
| | (d) | The universe is a singular, isolated entity () | | | | | | | | | |

10. Socrates was a philosopher from

| (a) | Rome | (|) | | (b) | Athens | (|) |
|-----|------------|---|---|---|-----|--------|---|---|
| (c) | Alexandria | | (|) | (d) | Sparta | (|) |

(SECTION : B-SHORT ANSWERS)

(Marks: 25)

Answer *five* questions, taking at least *one* from each Unit : $5 \times 5 = 25$

Unit—I

- How did Galileo's observations support the Copernican model of solar system?
- 2. Describe Archimedes' work on the lever.
- 3. What is the formula for Newton's second law of motion, and what does it describe?

Unit—II

- 4. What is the Big Bang Theory?
- 5. What are black holes?
- 6. What are the dark matter and dark energy?

Unit—III

- 7. What is meant by 'collapse' of the wave function?
- 8. What is a parallel universe?
- 9. What role does the strength of gravity play in the fine-tuning argument?

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[Contd.

(SECTION : C-DESCRIPTIVE)

(Marks: 40)

Answer four questions, taking at least one from each Unit :

UNIT—I

1. What is Newton's notion of space and time?

2. Describe the Copernicus heliocentric model of the universe.

3. Write a brief note on the works of Archimedes or Socrates.

Unit—II

- 4. Describe the role of supernovae in the context of the universe's evolution.
- **5.** Explain the significance of the cosmic microwave background (CMB) in our understanding of the universe's evolution.
- 6. Write a brief note on the life cycle of stars.

Unit—III

- Explain how Many-World Interpretation of quantum mechanics differs from Copenhagen interpretation.
- 8. What is the concept of fine-tuning in the context of cosmology?
- 9. What is meant by the universal wave function in Many-World interpretation?

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10×4=40