51. Match the following ISRO satellites (List-I) with their functions (List-II):  
List–I List–II  
a. Cartosat-2 Series 1. Earth observation for cartography  
b. IRNSS (NavIC) 2. Regional navigation satellite system  
c. RISAT-1 3. Synthetic aperture radar imaging  
d. GSAT-11 4. Communication satellite providing broadband services  
Select the correct answer using the codes given below.  
(A) abcd → 1234  
(B) abcd → 1243  
(C) abcd → 2134  
(D) abcd → 3214

Answer 51. (A) abcd → 1234

Explanation:

* Cartosat-2 Series satellites are primarily used for earth observation and cartographic applications.
* The IRNSS (also known as NavIC) is India’s regional navigation satellite system.
* RISAT-1 is designed for synthetic aperture radar imaging to provide all-weather surveillance.
* GSAT-11 is a communication satellite that provides broadband services across India.

52. Consider the following statements regarding Graphene:  
(i) It is a two-dimensional form of carbon atoms arranged in a hexagonal lattice.  
(ii) Graphene is an excellent conductor of electricity and heat.  
(iii) Graphene cannot be used for water purification due to toxicity concerns.  
(iv) It has potential applications in energy storage and flexible electronics.  
Which of the above statements are correct?  
(A) (i), (ii) and (iv) only  
(B) (ii) and (iii) only  
(C) (i) and (iii) only  
(D) All the statements are correct

Answer 52. (A) (i), (ii) and (iv) only

Explanation:

* Graphene consists of a single layer of carbon atoms arranged in a two-dimensional hexagonal lattice structure.
* It is renowned for its exceptional electrical and thermal conductivity.
* Graphene has many potential uses including water purification, energy storage, and flexible electronics; toxicity concerns do not make it unsuitable for water purification.
* The correct statements are (i), (ii), and (iv).

53. Consider the following statements about nuclear fusion:  
(i) It is the process of combining two light atomic nuclei to form a heavier nucleus.  
(ii) It releases more energy than nuclear fission per reaction.  
(iii) Fusion reactions occur naturally in the Sun.  
(iv) Fusion produces long-lived radioactive waste like fission.  
Which of the above statements are correct?  
(A) (i), (ii), and (iii) only  
(B) (i), (ii), and (iv) only  
(C) (ii) and (iii) only  
(D) All the statements are correct

Answer 53. (A) (i), (ii), and (iii) only

Explanation:

* Nuclear fusion combines lighter nuclei like hydrogen to form a heavier nucleus (such as helium), as occurs in stars.
* Fusion reactions release more energy per reaction than fission.
* The Sun and other stars are powered by fusion reactions.
* Unlike fission, nuclear fusion does not produce long-lived radioactive waste in significant amounts.

54. Consider the following statements about microRNA (miRNA):  
(i) miRNAs are typically 20-24 nucleotides long.  
(ii) They function mainly in post-transcriptional gene silencing.  
(iii) miRNAs are translated into proteins that regulate gene expression.  
(iv) miRNAs are involved in the regulation of developmental processes.  
Which of the above statements are correct?  
(A) (i), (ii), and (iv) only  
(B) (ii) and (iii) only  
(C) (i) and (iii) only  
(D) All of the above

Answer 54. (A) (i), (ii), and (iv) only

Explanation:

* microRNAs (miRNAs) are short RNA molecules usually 20–24 nucleotides in length.
* They regulate gene expression by post-transcriptional gene silencing, binding to target mRNAs to inhibit their translation.
* miRNAs themselves are not translated into proteins but play a regulatory role, especially in development and differentiation.

55. Consider the following statements about Satyendra Nath Bose:  
(i) He collaborated with Albert Einstein on the foundation of Bose-Einstein statistics.  
(ii) Bose’s work led to the prediction of a new state of matter called the Bose-Einstein condensate.  
(iii) The term “boson” was coined by Bose himself.  
(iv) He received the Bharat Ratna, India’s highest civilian award.  
Which of the above statements are correct?  
(A) (i), (ii) and (iv) only  
(B) (ii) and (iii) only  
(C) (i) and (ii) only  
(D) All the statements are correct

Answer 55. (C) (i) and (ii) only

Explanation:

* Satyendra Nath Bose’s collaboration with Einstein established Bose-Einstein statistics, which later led to the prediction of the Bose-Einstein condensate.
* The term “boson” was coined by Paul Dirac to honor Bose, not by Bose himself.
* Satyendra Nath Bose was never awarded the Bharat Ratna.

56. Consider the following statements about CRISPR-Cas9 technology:  
(i) It is a gene-editing tool derived from bacterial immune systems.  
(ii) CRISPR-Cas9 can be used to add, delete, or alter genetic material in organisms.  
(iii) It has been widely used only in plant genetics and not in animal research.  
(iv) Ethical concerns include off-target mutations and germline editing.  
Which of the above statements are correct?  
(A) (i), (ii), and (iv) only  
(B) (ii) and (iii) only  
(C) (i) and (iii) only  
(D) All the statements are correct

Answer 56. (A) (i), (ii), and (iv) only

Explanation:

* CRISPR-Cas9 is inspired by bacterial immune systems and serves as a powerful and precise genome editing technique.
* The technology is applicable for adding, deleting, or altering specific DNA sequences in plants, animals, and even humans, not just plants.
* Key ethical concerns include off-target genetic alterations and heritable (germline) modifications.

57. If an object moves in a straight line with constant acceleration, which of the following statements is correct?  
(A) Velocity is constant  
(B) Acceleration is zero  
(C) Displacement-time graph is a parabola  
(D) Speed decreases uniformly

Answer 57. (C) Displacement-time graph is a parabola

Explanation:

* With constant acceleration, displacement (s) varies as s = ut + (1/2)at², making the displacement-time graph a parabola.
* The velocity changes uniformly, not constant.
* Zero acceleration would mean velocity is constant, which is not the case here.
* Speed increases or decreases uniformly but the graph for displacement is parabolic.

58. Which of the following physical properties of liquids is responsible for the resistance to flow?  
(A) Surface tension  
(B) Viscosity  
(C) Vapour pressure  
(D) Density

Answer 58. (B) Viscosity

Explanation:

* Viscosity is the property of a liquid that provides resistance to flow.
* It results from internal friction between liquid molecules moving past each other.
* Surface tension relates to the interface with another phase, vapor pressure and density are not directly connected to flow resistance.

59. Match the following books (List-I) with their authors (List-II):  
List-I (Books) List-II (Authors)  
a. The Assam Movement: Class, Ideology and Identity 1. Hiren Gohain  
b. In the Name of the Nation: India and its Northeast 2. Sanjib Baruah  
c. Colonialism and Its Unmasking in Assam 3. Arupjyoti Saikia  
d. Saga of Assam Tea 4. Arup Kumar Dutta  
(A) abcd → 1 2 3 4  
(B) abcd → 3 4 1 2  
(C) abcd → 2 3 1 4  
(D) abcd → 4 3 2 1

Answer 59. (A) abcd → 1 2 3 4

Explanation:

* “The Assam Movement: Class, Ideology and Identity” was authored by Hiren Gohain.
* “In the Name of the Nation: India and its Northeast” is written by Sanjib Baruah.
* “Colonialism and Its Unmasking in Assam” is by Arupjyoti Saikia.
* “Saga of Assam Tea” was authored by Arup Kumar Dutta.

60. Consider the following statements about the Sustainable Development Goals (SDGs):  
(i) There are 17 SDGs adopted by the United Nations in 2015.  
(ii) SDGs aim to ensure inclusive and equitable quality education for all by 2030.  
(iii) SDGs include targets related to Climate Action and Life Below Water.  
(iv) SDGs are legally binding for all UN member countries.  
Select the correct answer using the codes given below.  
(A) (i), (ii), and (iii) only  
(B) (ii) and (iv) only  
(C) (i), (iii), and (iv) only  
(D) All of the above

Answer 60. (A) (i), (ii), and (iii) only

Explanation:

* The United Nations adopted 17 Sustainable Development Goals (SDGs) in 2015.
* SDG 4 targets quality education, and other goals focus on climate action (SDG 13) and life below water (SDG 14).
* However, SDGs are not legally binding; they are voluntary and aspirational commitments for member countries.