51. Match the following satellite missions with their objectives:  
List–I List–II  
a. Oceansat-2 1. Study of ocean surface and ecosystem  
b. NavIC 2. Regional satellite navigation  
c. Astrosat 3. Multi-wavelength astronomical observations  
d. RISAT Series 4. Radar imaging and reconnaissance  
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:

* Oceansat-2 is designed for studying ocean surface and ecosystems.
* NavIC serves as India’s regional satellite navigation system.
* Astrosat conducts multi-wavelength astronomical observations.
* RISAT Series satellites are used for radar imaging and reconnaissance.

52. Consider the following about quantum dots:  
(i) They are semiconductor nanocrystals with size-dependent optical properties.  
(ii) Quantum dots are used in display technologies and biomedical imaging.  
(iii) Quantum dots are composed exclusively of organic polymers.  
(iv) They exhibit fluorescence when exposed to UV light.  
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:

* Quantum dots are semiconductor nanocrystals exhibiting size-dependent optical properties and show fluorescence under UV light.
* They have applications in display technology and biomedical imaging.
* They are not composed exclusively of organic polymers; this makes statement (iii) incorrect.

53. The Joint European Torus (JET) is:  
(A) A nuclear fission research project in Europe  
(B) The largest operational nuclear fusion experiment till date  
(C) An Indian nuclear reactor project  
(D) A space-based solar observation satellite

Answer 53. (B) The largest operational nuclear fusion experiment till date

Explanation:

* JET is currently the largest experimental nuclear fusion facility in operation, aiming to harness fusion energy.
* It is a multinational project based in Europe, not related to fission, Indian reactors, or space-based satellites.

54. Consider the following statements regarding the biogenesis of microRNA:  
(i) miRNAs are transcribed by RNA polymerase II as primary miRNAs (pri-miRNAs).  
(ii) Drosha and Dicer enzymes are involved in the processing of miRNAs.  
(iii) Mature miRNAs bind to messenger RNAs to promote their translation.  
(iv) miRNA genes are found only in introns of protein-coding genes.  
Which of the above statements are correct?  
(A) (i) and (ii) only  
(B) (ii) and (iii) only  
(C) (i), (ii), and (iv) only  
(D) All of the above

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

Explanation:

* miRNAs are initially transcribed as pri-miRNAs by RNA polymerase II.
* Drosha and Dicer are key enzymes processing pri-miRNA into mature miRNA.
* Mature miRNAs bind to mRNA to inhibit translation or degrade transcripts, not to promote translation.
* miRNA genes may be located in introns or intergenic regions, so (iv) is incorrect.

55. The Bose-Einstein statistics applies to which kind of particles?  
(i) Particles with integer spin called bosons  
(ii) Particles with half-integer spin called fermions  
(iii) Particles that obey the Pauli Exclusion Principle  
(iv) Particles that can occupy the same quantum state simultaneously  
Select the correct answer:  
(A) (i) and (iv) only  
(B) (ii) and (iii) only  
(C) (i), (iii), and (iv) only  
(D) All of the above

Answer 55. (A) (i) and (iv) only

Explanation:

* Bose-Einstein statistics pertains to bosons, particles with integer spins.
* Bosons can occupy the same quantum state simultaneously.
* Fermions (half-integer spins) obey the Pauli Exclusion Principle, which is not part of Bose-Einstein statistics.

56. Consider the following about quantum supremacy:  
(i) It refers to the point when a quantum computer performs a task faster than any classical computer.  
(ii) Google claimed to achieve quantum supremacy in 2019 with its Sycamore processor.  
(iii) Quantum supremacy means quantum computers are ready for widespread commercial use.  
(iv) It is a threshold, not related to error correction in quantum computing.  
Which of the above statements are correct?  
(A) (i) and (ii) only  
(B) (ii) and (iii) only  
(C) (i), (ii), and (iv) only  
(D) All the statements are correct

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

Explanation:

* Quantum supremacy is the point where a quantum computer outperforms classical ones in specific tasks.
* Google claimed to achieve this milestone in 2019 with the Sycamore chip.
* It does not imply readiness for widespread commercial use.
* Quantum supremacy is a threshold concept distinct from error correction issues.

57. Which of the following quantities remains constant during projectile motion when air resistance is neglected?  
(A) Horizontal velocity  
(B) Vertical velocity  
(C) Magnitude of velocity  
(D) Acceleration in the horizontal direction

Answer 57. (A) Horizontal velocity

Explanation:

* In projectile motion without air resistance, the horizontal velocity remains constant because there are no horizontal forces acting on the object.
* Vertical velocity changes due to gravity.
* The speed (magnitude of velocity) varies and horizontal acceleration is zero.

58. The physical property that determines whether a liquid will form droplets or spread out on a surface is:  
(A) Viscosity  
(B) Surface tension  
(C) Density  
(D) Compressibility

Answer 58. (B) Surface tension

Explanation:

* Surface tension influences how a liquid interacts with a surface, determining whether it forms droplets or spreads as a film.
* Viscosity relates to flow resistance; density and compressibility do not determine spreading behavior.

59. Match the following books (List-I) with their authors (List-II):  
a. A Century of Manipuri Christianity 1. N. Joykumar Singh  
b. Look Back in Anger: The Shillong Uprising 2. Homen Borgohain  
c. Mountains Come Alive: Regionalism and Politics in Northeast India 3. H. S. Gill & M. C. R. Burman  
d. Red River, Blue Hills 4. Hem Barua  
(A) abcd → 1 2 3 4  
(B) abcd → 2 1 3 4  
(C) abcd → 4 1 3 2  
(D) abcd → 3 2 4 1

Answer 59. (A) abcd → 1 2 3 4

Explanation:

* “A Century of Manipuri Christianity” authored by N. Joykumar Singh.
* “Look Back in Anger: The Shillong Uprising” authored by Homen Borgohain.
* “Mountains Come Alive: Regionalism and Politics in Northeast India” authored by H. S. Gill & M. C. R. Burman.
* “Red River, Blue Hills” by Hem Barua.

60. Which of the following are core principles of the SDGs?  
(i) Universality  
(ii) Integration  
(iii) Leaving no one behind  
(iv) Exclusivity of developed countries' responsibility  
Select the correct answer using the codes given below.  
(A) (i), (ii), and (iii) only  
(B) (ii) and (iv) only  
(C) (i) and (iv) only  
(D) All of the above

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

Explanation:

* The SDGs are based on universality, integration across economic, social, and environmental pillars, and the principle of leaving no one behind.
* Responsibility is shared globally; exclusivity of developed countries is not a core SDG principle.