1. Match the following ISRO space missions with their launch vehicles:  
   List–I — List–II  
   a. Chandrayaan-2 — 1. PSLV-XL  
   b. Mars Orbiter Mission (MOM) — 2. PSLV-C25  
   c. GSAT-6A — 3. GSLV Mk-II  
   d. RISAT-2BR1 — 4. PSLV-C43  
   Select the correct answer using the codes below:  
   (A) abcd → 2134  
   (B) abcd → 1234  
   (C) abcd → 3214  
   (D) abcd → 4321

Answer 51. (A) abcd → 2134

Explanation:

* Mars Orbiter Mission (MOM) was launched on PSLV-C25.
* Chandrayaan-2 was launched on PSLV-XL (PSLV-C27).
* GSAT-6A was launched on GSLV Mk-II.
* RISAT-2BR1 was launched onboard PSLV-C43.

1. With respect to carbon nanotubes (CNT), consider the statements:  
   (i) Have extraordinary mechanical strength and electrical conductivity.  
   (ii) Cylindrical molecules composed entirely of carbon atoms.  
   (iii) Primarily used in lithium-ion batteries.  
   (iv) Toxicity well established, limiting commercial use.  
   Which are correct?  
   (A) (i), (ii), and (iii)  
   (B) (ii) and (iv)  
   (C) (i) and (iv)  
   (D) All

Answer 52. (A) (i), (ii), and (iii)

Explanation:

* CNTs display exceptional mechanical strength and conductivity.
* They are carbon allotropes formed as tubes.
* They are used extensively in electronics including lithium-ion batteries.
* Toxicity is a subject of ongoing research; it's not conclusively limiting commercial use.

1. The Joint European Torus (JET) is:  
   (A) Nuclear fission research project.  
   (B) Largest operational nuclear fusion experiment.  
   (C) Indian nuclear reactor project.  
   (D) Space-based solar satellite.

Answer 53. (B) Largest operational nuclear fusion experiment.

Explanation:

* JET is a premier fusion reactor project based in Europe aiming at controlled thermonuclear fusion.

1. Regarding microRNA biogenesis:  
   (i) miRNAs are transcribed as pri-miRNAs by RNA polymerase II.  
   (ii) Drosha and Dicer enzymes process miRNAs.  
   (iii) miRNAs promote gene expression via histone acetylation.  
   (iv) miRNAs regulate gene expression post-transcriptionally without DNA change.  
   Which are correct?  
   (A) (i), (ii), and (iv)  
   (B) (ii) and (iii)  
   (C) (i) and (iii)  
   (D) All

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

Explanation:

* miRNAs are transcribed as pri-miRNAs by RNA pol II, processed by Drosha and Dicer, and regulate genes by post-transcriptional silencing.
* They do not modify histones to activate gene expression directly.

1. Bose-Einstein statistics applies to:  
   (i) Particles with integer spin (bosons).  
   (ii) Particles with half-integer spin (fermions).  
   (iii) Particles obeying Pauli exclusion principle.  
   (iv) Particles occupying same quantum state simultaneously.  
   Choose:  
   (A) (i) and (iv)  
   (B) (ii) and (iii)  
   (C) (i), (iii), and (iv)  
   (D) All

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

Explanation:

* Bose-Einstein statistics describes bosons (integer spin) that can share quantum states.
* Fermions (half-integer spin) follow Fermi-Dirac statistics and Pauli exclusion principle.

1. About quantum supremacy:  
   (i) Computational speed advantage over classical computers.  
   (ii) Claimed by Google in 2019 with Sycamore.  
   (iii) Indicates readiness for commercial use.  
   (iv) Threshold, distinct from error correction.  
   Which are correct?  
   (A) (i) and (ii)  
   (B) (ii) and (iii)  
   (C) (i), (ii), and (iv)  
   (D) All

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

Explanation:

* Quantum supremacy refers to quantum computers outperforming classical ones for specific tasks, as claimed by Google in 2019.
* It doesn't mean commercial readiness.
* It's a threshold concept, separate from error correction needs.

1. Two objects moving with equal velocity in opposite directions have a relative velocity of:  
   (A) Zero  
   (B) Equal to individual velocity  
   (C) Sum of individual velocities  
   (D) Difference of individual velocities

Answer 57. (C) Sum of individual velocities

Explanation:

* When two objects move towards each other with velocities v and -v, their relative velocity is v + v = 2v.

1. The property influencing whether a liquid forms droplets or spreads on a surface is:  
   (A) Viscosity  
   (B) Surface tension  
   (C) Density  
   (D) Compressibility

Answer 58. (B) Surface tension

Explanation:

* Surface tension determines how liquids interact with surfaces—high tension favors droplets; low tension allows spreading.

1. Match authors and their works:  
   a. Udayon Misra —1. Globalization and identity in northeast India  
   b. Sanjoy Hazarika —2. Strangers of Mist  
   c. Amalendu Guha —3. Planter Raj to Swaraj  
   d. Yasmin Saikia —4. Women, War, and Making of Bangladesh  
   Options:  
   (A) 1 2 3 4  
   (B) 2 1 3 4  
   (C) 1 4 2 3  
   (D) 3 2 4 1

Answer 59. (A) 1 2 3 4

Explanation:

* Udayon Misra authored work on globalization and northeast India identity.
* Sanjoy Hazarika wrote ‘Strangers of Mist’.
* Amalendu Guha authored ‘Planter Raj to Swaraj’.
* Yasmin Saikia wrote ‘Women, War, and Making of Bangladesh’.

1. The SDG indicator framework:  
   (i) Includes global indicators developed by UN.  
   (ii) Is static, not evolving.  
   (iii) Requires countries to adapt indicators nationally.  
   (iv) Focuses only on economic indicators.  
   Which are correct?  
   (A) (i) and (iii)  
   (B) (ii) and (iv)  
   (C) (i), (iii), and (iv)  
   (D) All

Answer 60. (A) (i) and (iii)

Explanation:

* SDG indicators are global but adaptable to national contexts.
* The framework evolves with emerging challenges and covers economic, social, and environmental areas.
* Focusing only on economic indicators is incorrect.