



# All India Civil Services Coaching Centre

(Under the aegis of Government of Tamil Nadu)

## TEST BOOKLET Science and Technology

**Time Allowed: 2 Hours**

**Maximum Marks: 200**

### INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET
2. You have to enter your Name on the Test Booklet
3. This Test Book contains 100 items (questions). Each it comprises four responses (answers). You will select the response, which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response, which you consider the best. In any case, choose ONLY ONE response for each item.
4. You have to mark all your response ONLY on the separate sheet provided along with the Test Booklet.
5. All items Carry equal marks. There will be **penalty (negative marking)** for wrong answers marked by you in the Answer sheet.
6. There are four alternatives for the answers to every question. For each question for which a wrong answer has been given by the candidate, one third ( $\frac{1}{3}$ ) of the marks assigned to that question will be deducted as penalty.
7. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will same penalty as above for that question.
8. If a question is left blank i.e., no answer is given by the candidate, there will be no penalty for that question.

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ASKED TO DO SO**



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1. Chemicals are added to food for their preservation, enhancing their appeal, and to add nutritive value in them.  
Which of the following additives have nutritive value?
  1. Fat emulsifiers
  2. Stabilising agents
  3. Food coloursSelect the correct answer using the codes below.
  - (a) 1 and 2 only
  - (b) 3 only
  - (c) 1 and 3 only
  - (d) None of the above
2. Antibiotic resistance can occur due to
  1. Natural selection in bacteria when exposed to anti-biotics repeatedly
  2. Attack of bacteria on the host immune system
  3. By genetic mutation in the bacteriaSelect the correct answer using the codes below.
  - (a) 1 and 3 only
  - (b) 2 only
  - (c) 1 and 2 only
  - (d) 1, 2 and 3
3. Consider the following statements.
  1. Methanol is also known as Wood spirit.
  2. Hydrogen Peroxide slowly decomposes in the presence of light.
  3. Acetaldehyde is a carcinogenic air toxin.Select the correct answer using the codes below.
  - (a) 1 only
  - (b) 3 only
  - (c) 1, 2 and 3
  - (d) 2 only
4. Histamine is related to
  1. Secretion of acid in stomach
  2. Allergy from pollen grains
  3. Nasal congestion associated with common coldSelect the correct answer using the codes below.
  - (a) 1, 2 and 3
  - (b) 2 and 3 only
  - (c) 1 and 3 only
  - (d) 1 and 2 only
5. Consider the following statements regarding a Fast Radio Burst (FRB):
  1. FRBs are disturbances in the curvature of space-time that propagate as waves outward from their source at the speed of light.
  2. FRBs can be produced by astronomical objects with changing magnetic fields.
  3. A magnetar is a highly magnetized rotating compact star that emits beams of electromagnetic radiation out of its magnetic poles.Which of the above statements is/are incorrect?
  - (a) 1 only
  - (b) 1 and 3 only
  - (c) 2 and 3 only
  - (d) 3 only

6. Consider the following statements:
1. India has developed the Solid Fuel Ducted Ramjet technology with the help of Israel.
  2. The Solid Fuel Ducted Ramjet propelled missile uses the air-breathing ramjet propulsion technology.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

7. Consider the following statements regarding the Experimental Advanced Superconducting Tokamak (EAST):

1. It is an experimental superconducting tokamak magnetic fusion energy reactor in the USA.
2. It is an "Artificial Sun" designed to replicate the process our natural Sun uses to generate energy.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

8. Consider the following statements about the Xafecopy Trojan malware:

1. It is disguised as a useful app and operates normally.
2. The malware uses technology to bypass 'captcha' systems designed to protect users by confirming the action is being performed by a human.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

9. Consider the following statements about the space harpoon:

1. The space harpoon is a part of the RemoveDEBRIS project.
2. The harpoon is meant for larger targets, for example full-size satellites that have malfunctioned and are drifting from their orbits.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

10. Which of the following statements is/are correct about the IndOBIS?

1. IndOBIS is responsible for the collection, collation and dissemination of data and information about biodiversity.
2. It supplies the global scientific community with various types of geo-referenced information on the biodiversity of the Indian Ocean and the Pacific Ocean.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

11. Which of the following statements is/are correct?

1. Cyber-Physical Systems (CPS) are a new class of engineered systems that integrate computation and physical processes in a dynamic environment.
2. The National Mission on Interdisciplinary Cyber-Physical Systems aims to create a strong foundation and a seamless ecosystem for CPS technologies.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only

- (c) Both 1 and 2
- (d) Neither 1 nor 2

12. Consider the following statements about RISC-V:

1. It is a proprietary architecture used in microprocessor design.
2. It has been developed by the University of California, Berkeley.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

13. Consider the following statements about the Kessler Syndrome:

1. It is related to space debris.
2. It predicts that the number of objects in the Low Earth Orbit will decrease due to debris settling on the Earth by gravity.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

14. Consider the following statements:

1. Augmented reality (AR) is an artificial, computer-generated simulation of a real life environment or situation.
2. Virtual reality (VR) is a technology that layers computer-generated enhancements atop an existing reality.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

15. Consider the following statements about the Liquid Apogee Motor (LAM):

1. It refers to a type of chemical rocket engine, typically used as the main engine in a spacecraft.
2. It is basically a propeller used to put the satellite in the desired orbit.
3. Flawless functioning of the LAM was pivotal to the Mars Orbiter Mission (MOM).

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

16. Consider the following statements about Red Shift:

1. It refers to the displacement of the spectrum of an astronomical object toward shorter wavelengths.
2. It is attributed to the Doppler Effect.
3. This shift indicates that all the galaxies are moving away from us.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

17. Consider the following statements about the Cryogenic Engine:

1. A cryogenic engine is the last stage of space launch vehicles which makes use of cryogenics.
2. It is more efficient than solid and earth-storable liquid propellant rocket stages.
3. It provides more thrust for every kilogram of propellant it burns.
4. ISRO is yet to develop an indigenous cryogenic engine.

Which of the statements given above are correct?

- (a) 1 and 2 only

- (b) 1, 2 and 3 only
- (c) 3 and 4 only
- (d) 1, 2, 3 and 4

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

18. Consider the following statements:

1. The pancreatic juice acts on carbohydrates, fats and proteins, and changes them into simpler forms.
2. The large intestine's function is to absorb water and some salts from the undigested food material.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

19. Consider the following statements about fixed-dose-combination (FDC) drug:

1. It is a cocktail of two or more active drug ingredients in a fixed ratio of doses.
2. It can proliferate anti-microbial resistance.
3. It is completely banned in India.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

20. With reference to imaging technologies, consider the following statements about difference(s) between coloured-3D X-rays scanner and conventional black & white X-rays scanner:

1. Coloured scanners record the precise energy levels of the X-rays, as they hit each particle in your body.
2. The conventional scanners only record X-rays that pass through the body or get absorbed by the bones.

Which of the statements given above is/are correct?

21. Which of the following is/are the impact(s) of the Repurpose Used Cooking Oil?

1. Employment generation and economic growth.
  2. Cleaner environment with reduced carbon footprint.
  3. Infrastructural investment in rural areas.
- Select the correct answer using the code given below:
- (a) 1 only
  - (b) 1 and 2 only
  - (c) 2 and 3 only
  - (d) 1, 2 and 3

22. Consider the following statements about the CCR5 gene:

1. A natural mutation in CCR5 genes offers protection against HIV infection.
2. A Chinese scientist used CCR5 gene mutation to produce HIV resistant children.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

23. Mitochondrial Eve relates to which of the following?

- (a) It is a genetic disease due to mutation in mitochondrial genes.
- (b) It is the name of the technology used to produce a three parent babies.
- (c) It is the name of a common female ancestor from which all humans trace their descent.
- (d) It is the name of the genetic changes taking place in mitochondria when females hit menopause.

24. Consider the following statements:
1. Food irradiation improves the safety and extends the shelf life of foods.
  2. Irradiation does not make foods radioactive, a compromise nutritional quality.
  3. Irradiation can be used to sterilize foods, which can then be stored for years without refrigeration.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

25. Consider the following statements:
1. Carotenoids are naturally occurring pigments synthesized by animals.
  2. They are naturally occurring fat- soluble pigments.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

26. Which of the following statements is/are correct?
1. Deoxyribonucleic acid (DNA) is the chemical compound that contains the instructions needed to develop and direct the activities of nearly all living organisms.
  2. DNA contains the information needed to build the entire human body.
  3. DNA cannot replicate itself.

Select the correct answer using the code given below:

- (a) 2 only
- (b) 1 and 2 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

27. Consider the following statements about King Cobra:
1. It belongs to the Reptilia group of animalia kingdom.
  2. This is the only species of snake in the world that builds nests.
  3. It can live for months without food.
  4. It is snake eater species.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1, 2 and 3 only
- (c) 3 and 4 only
- (d) 1, 2, 3 and 4

28. Which of the following statements is/are correct regarding Bioink?
1. It can be used for printing at a much lower temperature.
  2. It can be used for 3D printing of complex tissue models.
  3. It is generally derived from natural polymers, such as gelatins, alginates and fibrin.

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 only
- (d) 1, 2 and 3

29. Consider the following statements:
1. Robo-insects can draw its power from lithium ion battery and can travel upto 10 km continuously, without recharging the battery.
  2. Robo-insects can carry out pollination services.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

30. Consider the following statements:
1. Carotenoids are a class of phytonutrients found in the cells of a wide variety of plants, algae and bacteria.
  2. Carotenoids are carcinogenic in the human body.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

31. Consider the following statements:
1. The Quadrantids are considered to be one of the best annual meteor showers.
  2. The Quadrantids have a two-day peak, like most of the meteor showers.
  3. Quadrantids are also known for their bright fireball meteors.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

32. Consider the following statements about Lagrange Points:
1. Lagrange Points are the positions in the space where the objects sent there tend to stay put.
  2. At the Lagrange Points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them.
  3. These points in the space can be used by the spacecraft to reduce fuel consumption needed to remain in position.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only

- (c) 2 and 3 only
- (d) 1, 2 and 3

33. With reference to EAST (Experimental Advanced Superconducting Tokamak), consider the following statements:

1. It is a nuclear fusion reactor.
2. The EAST is one of 3 major domestic tokamaks that are presently being operated across Japan.
3. It is a quest to unlock clean and limitless energy, with minimal waste products.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

34. Consider the following statements about the MUSE mission:

1. The primary goal of the MUSE mission is to investigate the causes of coronal heating and instability.
2. The mission will provide complementary observations from heliophysics research, such as the Extreme Ultraviolet Spectroscopic Telescope and ground-based observatories.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

35. Consider the following statements about the Radio Frequency Identification (RFID) Technology:

1. RFID tags can only be read when the tags and the readers are in the line-of-sight.
2. RFID technology automates data collection.
3. Multiple RFID tags can be read

simultaneously by the RFID readers.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

36. Consider the following statements about Graphite:

- 1. Graphite is a material used for making the anodes in the Lithium-ion batteries.
- 2. China is the world's largest producer of graphite in the world.
- 3. India has no domestic production of graphite.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

37. With reference to the Anti-Satellite (A-SAT) missile developed by India, consider the following statements:

- 1. The A-SAT missile is based on the endo-atmospheric kill vehicle technology.
- 2. It was developed under the Vajra Prahar Exercise.
- 3. India became only the 4th country to conduct an Anti-Satellite missile test, after USA, Russia and China.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

38. Consider the following statements:

- 1. Fly-bys are 'gravity assist' manoeuvres, which enable the interplanetary ships to either gain or lose momentum and modify their orbits around the Sun,

without consuming large amounts of fuel.

- 2. BepiColombo uses them to brake, so that it falls towards the inner solar system.
- 3. A major focus for BepiColombo is water-ice deposits inside the permanently shaded craters in Mercury's Polar Regions.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

39. Which of the following reasons is/are correct regarding the scattering of the sunlight?

- 1. The longer the radiation travels through atmosphere, the lesser is the scattering.
- 2. Blueish colour of the sky and reddish colour of the Sun at sunrise and sunset is because of the scattering.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

40. Ball bearings are used in bicycles, cars, etc., because

- (a) the actual area of contact between the wheel and axle is increased
- (b) the effective area of contact between the wheel and axle is increased
- (c) the effective area of contact between the wheel and axle is reduced
- (d) None of the above statements is correct

41. Why aluminium is used to wrap food items?

- (a) It is not a malleable material
- (b) It is unreactive with the food items
- (c) It is very ductile in nature
- (d) It keeps food warm since aluminium is good insulator



42. Consider the following statements:
1. Albedo effect refers to the reflecting back of incoming solar radiation from white surfaces on the earth back into the atmosphere and space
  2. The greenhouse effect plays a vital role in maintaining optimum temperatures for life on earth's surface.
  3. Global Dimming is a phenomenon where there has been a decline in the total solar irradiance reaching the earth's surface due to reflection midway from the atmosphere back into space.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

43. Which of the following statements regarding Radioactive Wastes is/ are correct?

1. Low doses of exposure to it cannot cause genetic disorders and mutations.
2. It can be caused by phosphate rock processing.
3. Bamako Convention deals with the control of pollution from radioactive wastes.

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

44. Fruits stored in a cold chamber exhibit longer storage life because:

- (a) exposure to sunlight is prevented
- (b) concentration of carbon dioxide in the environment is increased
- (c) rate of respiration is decreased
- (d) there is an increase in humidity

45. Which of the following is incorrect regarding genetic engineering?

- (a) It makes crops more tolerant to only biotic stresses and not abiotic stresses.
- (b) It increases efficiency of mineral usage by plants.
- (c) It creates tailor-made plants.
- (d) It is used to create artificial insulin in labs.

46. Consider the following statements with reference to chemical plating and its applications:

1. Chrome plating increases the hardness, durability, and corrosion resistance of a surface.
2. Zinc plating increases the hardness but decreases the corrosion resistance of a surface

Which of the above-given statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

47. One day Selvi went to a jeweler's shop with her mother. Her mother gave an old gold jewelry to the goldsmith to polish. When they brought the jewelry back, they found that there was a slight loss in its weight.

What would be reason for the loss in weight?

- (a) Corrosion of gold
- (b) Reaction of gold with Aqua regia
- (c) Reaction of gold with sulphuric acid
- (d) Reaction of gold with mercury

48. In an airplane, Ethylene Glycol is added to Aviation Turbine Fuel (ATF) because:

- (a) it enhances anti-knocking properties of fuel
- (b) it increases octane number of fuel
- (c) it prevents the freezing of fuel
- (d) it improves consumption efficiency of fuel

49. Consider the following statements with reference to Nuclear reactors:

1. It works on the principle of nuclear fission.

2. Controllers are used to slow down the fast-moving neutrons.
3. Moderators can manage the reaction rate in nuclear fission.
4. Water acts as both a coolant and moderator in a reactor.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
  - (b) 2 and 3 only
  - (c) 3 and 2 only
  - (d) 1 and 4 only
50. Potassium and Sodium are kept immersed in kerosene oil because they:
- (a) get corroded easily in the presence of oxygen
  - (b) undergo a reduction reaction with the hydrogen present in the two mediums
  - (c) react vigorously with oxygen present in the water and air and catch fire
  - (d) occupy the last two positions in the reactivity series causing spontaneous a reaction
51. The term "AlphaFold" is talked about in the context of:
- (a) a data processing technology
  - (b) an exoplanet revolving around the Sun
  - (c) an AI-based protein structure prediction tool
  - (d) a drug used in animals to treat hand, foot and mouth disease
52. Why does the dust come out when a carpet is beaten with a stick?
- (a) Dust exerts equal and opposite force to the force applied by the stick
  - (b) Dust gains momentum due to the energy transfer between the stick and the dust particle
  - (c) Force applied by the stick sets carpet into motion while dust particles remain in rest due to inertia
  - (d) Force applied by the stick is equal to the static friction of the carpet

53. Which of the following are the applications of Ultrasound?

1. Cleaning of electronic components
2. Detection of cracks and flaws in metal blocks
3. Treatment for kidney stones
4. Observation of growth abnormalities in foetus

Select the correct answer using the code given below:

- (a) 1, 2 and 3
  - (b) 2 and 3 only
  - (c) 1 and 4 only
  - (d) 1, 2, 3 and 4
54. Which one of the following statements is correct with reference to 'Sonic Boom'?
- (a) These are waves with a frequency of more than 20 kHz and cannot be heard by humans.
  - (b) These are sounds associated with the shockwaves when object travels in air faster than the speed of light.
  - (c) These are shock waves produced when the sound producing source moves with a speed higher than that of sound.
  - (d) These sounds are produced by rhinoceroses, whales and elephants for communication.
55. Whenever one object exerts a force on another object, the second object exerts an equal and opposite on the first. However, a massive truck parked along the roadside will probably not move after application of force by a person. Which of the following is the reason behind this phenomena?
- (a) Truck will exert equal force on person and balance the original force
  - (b) Force applied by the person will be transferred to the tyres of the truck
  - (c) Gravity will cancel the perpendicular force applied by the person

- (d) Force applied by the person is not enough to overcome the friction between the surface and tyres of the truck

56. Which of the following statements are correct with reference to Laser Communications Relay Demonstration (LCRD)?

1. It is the first two-way, end-to-end optical relay launched by European Space Agency (ESA).
2. The digital data will be translated into laser signals and then transmitted via encoded beams of infrared light.
3. Unlike radio frequency communications, optical signals can penetrate cloud coverage.

Select the correct answer using the code given below:

- (a) 1 and 2 only  
(b) 2 only  
(c) 3 only  
(d) 1, 2 and 3

57. The Information Fusion Centre for the Indian Ocean Region (IFC-IOR) has started functioning. Consider the following statements in this regard:

1. It is an initiative of Bhabha Atomic Research Centre (BARC), supported by Ministry of Defence.
2. It aims to detect and deter maritime security threats of the region.
3. Maldives, Mauritius, and Sri Lanka have already joined the initiative.

Which of the statements given above is/are correct?

- (a) 2 and 3 only  
(b) 1 and 2 only  
(c) 1 and 3 only  
(d) 3 only

58. With reference to Kyasanur Forest Disease (KFD) consider the following statements:

1. KFD is endemic to the Indian state of

Rajasthan.

2. It is a bacterial disease that is transmitted to humans after a tick bite or contact with an infected animal.

Which of the statements given above is/are correct?

- (a) 1 only  
(b) 2 only  
(c) Both 1 and 2  
(d) Neither 1 and 2

59. With reference to the terrefaction technology, consider the following statements:

1. It is a technology that is developed indigenously by IIT, Delhi scientists.
2. It involves heating up straw, grass, saw mill residue and wood biomass to high temperatures.
3. It will change the elements of the biomass into 'coal-like' pellets.

Which of the statements given above is/are correct?

- (a) 1 and 2 only  
(b) 2 and 3 only  
(c) 1 only  
(d) 1, 2 and 3

60. With reference to applications of sound and its characteristics, consider the following statements:

1. The sonar technique is used to determine the density of sea water, lake water and ice shelves.
2. In stethoscopes, the sound of the patient's heartbeat reaches the doctor's ears by multiple reflections.
3. Phenomenon of echo is observed during the rolling of thunder.

Which of the statements given above is/are correct?

- (a) 1 and 2 only  
(b) 2 and 3 only  
(c) 1 and 3 only  
(d) 1, 2 and 3

61. With reference to nuclear reactions, consider the following statements:

1. In nuclear fission, a heavy nucleus breaks into two or more smaller fragments.
2. A chain reaction is made possible because more neutrons are produced in the single reaction than are consumed.
3. Fusion of Hydrogen nuclei into Helium nuclei is the source of energy of all stars including our sun.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

62. Which of the following is due to mother's milk being replaced too early by other foods which are poor in both proteins and calorie value?

- (a) Kwashiorkar
- (b) Marasmus
- (c) Emphysema
- (d) Osteoporosis

63. Early diagnosis and understanding its pathophysiology is very important for effective treatment of a disease. Which of the following techniques are widely used for early diagnosis?

1. Serum analysis
2. Recombinant DNA technology
3. Polymerase Chain Reaction (PCR)
4. Enzyme Linked Immuno-sorbent Assay (ELISA)

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 1, 2 and 3 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

64. With reference to bile juice in human digestive system, consider the following statements:

1. It is secreted by the liver.
2. It is an acidic liquid containing hydrochloric acid.
3. It contains digestive enzymes which aid in digestion of food.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

65. With reference to artificial satellites, consider the following statements:

1. Satellites in Sun synchronous orbits have higher altitude than those in geosynchronous orbits.
2. Sun synchronous satellites arrive at the same latitude at the same time every day.
3. Geo synchronous satellites have same orbital period as period of rotation of earth.

Which of the statements given above is/are correct?

- (a) 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

66. Which of the following statements best describe the term "Quantum Supremacy"?

- (a) It is a demonstration that a programmable quantum device can solve a problem that classical computers practically cannot.
- (b) It is harnessing and exploiting the laws of quantum mechanics to process information.
- (c) It is applying the principles of quantum mechanics to encrypt messages in a way that it is never read by anyone outside of the intended recipient.
- (d) It is running workloads remotely over the internet in a commercial provider's data.

67. Which of the following statements is not correct about "Gold nanoparticles (GNPs) "?  
 (a) These GNPs can be used as a composite therapeutic agent in clinical trials, especially in anti-cancer, anti-viral, anti-diabetic, and cholesterol-lowering drugs.  
 (b) GNPs have greater solar radiation absorbing ability than the conventional bulk gold, which makes them a better candidate for use in the photovoltaic cell manufacturing industry.  
 (c) GNPs are melted at much higher temperatures (8000 °C) than bulk gold.  
 (d) Gold nanoparticles can be used to detect biomarkers in the diagnosis of heart diseases, cancers, and infectious agents
68. Consider the following statements with reference to the Defence Trade and Technology Initiative (DTTI) :  
 1. The aim was to strengthen the US and India's defence industrial base by moving away from the traditional "buyer-seller" dynamic toward a more collaborative approach  
 2. Under this initiative both countries had signed agreements on GSOMIA, LEMOA and COMCASA.  
 Which of the above statements is/are correct ?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
69. Consider the following statements with reference to the Chaff technology :  
 1. Chaff is a critical defence technology used to protect fighter aircraft from hostile radar threats.  
 2. This technology is developed by the Defence Research and Development Organisation (DRDO).  
 Which of the above statements is/are correct ?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
70. Which of the following statements is incorrect with respect to the Man-Portable Anti-Tank Guided Missile (MPATGM) ?  
 (a) It is a low weight and fire & forget missile developed by Israel.  
 (b) The missile is incorporated with state-of-the-art Miniaturized Infrared Imaging Seeker along with advanced avionics.  
 (c) The man-portable missile is launched using a tripod designed for a maximum range of 2.5 km with a launch weight of less than 15 Kg.  
 (d) It is developed by the Defence Research & Development Organisation (DRDO).
71. "Enormous use of nanoparticles (NPs) considered may pose risks to the environment and biological systems " in this context, Consider the following statements about potential hazards of Nanoparticles?  
 1. Nanopollution is the reason for lung inflammation and heart problems.  
 2. Nanoparticles used to carry drugs may be toxic to the brain  
 3. Persistent insoluble nanoparticles may cause problems in the environment  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 1 and 2 only  
 (c) 2 and 3 only  
 (d) all the above
72. With reference to "Proton therapy for cancer", consider the following Statements :  
 1. It is a type of radiation therapy in a treatment that uses high-energy beams to treat tumors.  
 2. Proton therapy can be utilised for young adults and teenagers to reduce the risk of second cancer.  
 3. The use of pencil-beam technology that

provides a high degree of precision.

Which of the statements given above is/are correct ?

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) All the above

73. With reference to the PTFE (Polytetrafluoroethene), which was in news recently, consider the following statements:

1. PTFE is chemically inert and resistant to corrosion.
2. It finds its use in making oil seals and gaskets.

Which of the following statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

74. With reference to the Nanomaterials, consider the following statements:

1. Nanoparticles are the particles, having at least one dimension in the nano scale.
2. Generally, biodegradable and inorganic nanomaterials are employed for the purpose of targeted drug delivery.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

75. Disease 'X' is a highly contagious and fatal disease. It is currently diagnosed by a DNA based test called NAAT (Nucleic Acid Amplification Test). However, it is unreachable to a vast population especially in remote regions, as the equipment is expensive and is infrastructure dependent. Recently, researchers from IISc, Bangalore have developed a compact, stand-alone and

portable device that promises to overcome the limitation by drastically cutting down the costs, and it has been termed as FLIPP-NAAT (Fluorescent Isothermal Paper-and- Plastic NAAT). Here, the disease X is:

- (a) Cholera
- (b) Lyme disease
- (c) Syphilis
- (d) Tuberculosis (TB)

76. With reference to the genome editing technology, consider the following statements:

1. Genome editing technologies allow genetic material to be added, removed, or altered at particular locations in the genome.
2. USA scientists have developed a new variant of CRISPR-Cas9 by incorporating a new FnCas9 protein, for achieving high precision in the process.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

77. With reference to India's Three Stage Nuclear Programme, consider the following statements:

1. The first stage involves the use of Pressurized Heavy water reactor (PHWR) using unenriched Uranium.
2. Thorium would be used only in the third stage of this programme.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

78. With reference to Solar activity phenomena, consider the following statements:

1. Sun spots are relatively cool areas on sun's surface where magnetic field is particularly

weak.

- Solar flare is sudden explosion of energy due to crossing of magnetic field lines near sunspots.
- Coronal Mass Ejections (CMEs) are large expulsions of plasma and magnetic field from the Sun.

Which of the following statements is/are correct?

- 1 and 2 only
- 1 and 3 only
- 2 and 3 only
- 1, 2 and 3

79. Which among the following phenomenons may be explained by Total Internal Reflection?

- Mirage observed in deserts.
- Transmission of signals through optical fibre.
- Sky appearing blue.
- Clouds appearing white.

Select the correct answer using the code given below:

- 1 and 2 only
- 3 and 4 only
- 1, 2 and 3 only
- 1, 2, 3 and 4

80. With reference to magnetic properties of substances, consider the following statements:

- Paramagnetic substances are weakly attracted by a magnetic field.
- Diamagnetic substances are weakly repelled by a magnetic field.
- Diamagnetism is due to the presence of one or more unpaired electrons in an atom, molecule or ion.

Which of the following statements is/are correct?

- 1 and 2 only
- 2 and 3 only
- 1 and 3 only
- 1, 2 and 3

81. The Havana syndrome, refers to which of the following?

- It is a set of unexplained medical symptoms followed by odd physical sensations.
- A disease caused by a mutated virus affecting the inhabitants of Cuba.
- A syndrome detected in newborns worldwide affecting their cerebral functions.
- A rare medical condition where a person becomes allergic to Sulphur products.

82. Most of the progress in Electric Vehicles has come in advances in Lithium-ion batteries which have become the batteries of choice for electric vehicles, largely because of their high specific-energy. Lithium-ion batteries used in EVs have different chemistries. The NMC-LTO battery cells in these batteries use which of the following elements as electrodes?

- Tungsten
- Manganese
- Nickel
- Lithium

Select the correct answer using the code given below:

- 1, 2 and 3 only
- 2 and 4 only
- 2, 3 and 4 only
- 1, 3 and 4 only

83. Explosions in coal mines can occur due to the mixture of which of the following pair of gases?

- Carbon dioxide and methane
- Hydrogen and oxygen
- Methane and air
- None of the above

84. With reference to leaded petrol, consider the following statements:

- Tetraethyl lead is added to petrol due to its anti-knock and octane-boosting

- properties
2. Leaded petrol causes heart disease, stroke and cancer and even affects the development of the human brain, especially harming children.
  3. With Algeria finally stopping its use, the complete elimination of leaded automotive fuels worldwide has taken place.

Which of the statements given above are correct ?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

85. With reference to Artificial Intelligent system, consider the following statements:

1. United States of America became the first patent office to grant patent to an AI system.
2. DABUS (Device for the Autonomous Bootstrapping of Unified Sentience) became the first AI to get patent for its innovation for food containers.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

86. With reference to Helium, consider the following statements:

1. Helium has the lowest boiling point among known substance.
2. It is heavy and settles in the lower atmosphere only.
3. It is used as a cryogenic agent for carrying out various experiments at high temperatures.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 1 only

- (c) 1 and 3 only
- (d) 3 only

87. With reference to antacids, consider the following statements:

1. A mixture of aluminium and magnesium hydroxide can be used as antacid.
2. Histamine stimulates the secretion of pepsin and hydrochloric acid in the stomach.

Which of the statement given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

88. It is a known cancer-causing agent. It is commonly used to preserve bodies in mortuaries. It can also increase shelf life of fresh food. It can cause nausea, coughing and burning sensation in the eyes, nose and throat in the short term. It is a chemical commonly used in industry for the manufacturing of plastic resins that can be used in wood, paper and textile industry. It is a highly flammable, colourless gas with pungent and irritating odour. Which of the following is the chemical being discussed above?

- (a) Formalin
- (b) Sodium benzoate
- (c) Copper sulphate
- (d) Calcium carbide

89. With reference to Optoelectronic Applications of Nanomaterials, consider the following statements:

1. Optoelectronics is the study and application of electronic devices that source, detect and control light.
2. Surface-Enhanced Raman spectroscopy (SERS) can help detect harmful molecules present in water at high concentrations.

Which of the statements given above is/are correct:



- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

90. With reference to Metro Neo, consider the following statements:
1. The system consists of vehicles with one driver in the shape of pods, which can hold two to six people each.
  2. Metro Neo is designed to run on track but on road.
  3. It is suitable for places where the traffic demand is less.
- Which of the above statements is/are correct?
- (a) 1 and 2 only
  - (b) 2 and 3 only
  - (c) 3 only
  - (d) 1 and 3 only

91. With reference to Brucellosis disease, seen in news recently, consider the following statements:
1. It is a bacterial disease.
  2. It is contracted by humans from infected rodents.
  3. Human to human transmission of the disease is very rare.
- Which of the above statements is/are correct?
- (a) 1 only
  - (b) 1 and 3 only
  - (c) 2 and 3 only
  - (d) 1, 2 and 3

92. Which of the following statements is/are incorrect about Light Detection and Ranging (LIDAR)?
1. It uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.
  2. It can perform very well in foggy weather.
  3. Topographic LiDAR uses water- penetrating green light to also measure seafloor and riverbed elevations.
- Select the correct option using the codes given

below:

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

93. Consider the following statements:
1. Microwave is a form of electromagnetic radiation with wavelength in the micrometer range.
  2. Microwaves can be used to make direct energy weapons.
- Which of the above statements is/are correct?
- (a) 1 only
  - (b) 2 only
  - (c) Both 1 and 2
  - (d) Neither 1 nor 2

94. Which of the following problems may be caused due to use of detergents?
1. Bacteria may not be able to degrade them.
  2. These persist in water even after sewage treatment and cause foaming in rivers.
- Which of the above is/are correct?
- (a) 1 only
  - (b) 2 only
  - (c) Both 1 and 2
  - (d) None

95. Examples of acid producing microbes are
1. Aspergillus niger
  2. Acetobacter aceti
  3. Clostridium butylicum
  4. Lactobacillus
- Select the correct answer using the codes below.
- (a) 2 and 4 only
  - (b) 1, 2 and 3 only
  - (c) 1 and 4 only
  - (d) 1, 2, 3 and 4

96. In the context of certain archaeological and biological discoveries, *Lupinus arcticus* and *Phoenix dactylifera* are
- (a) Earliest known mammals in the Indian

subcontinent other than Homo Erectus and Homo Sapiens

- (b) Oldest known species of platypus found in Palaeolithic Western India
- (c) Very old seeds which remained alive even after thousands of years of dormancy
- (d) Species genetically related to Neanderthals found in Eastern Europe

97. Anaerobic digestion technologies in waste management can help to reduce the emission of greenhouse gases in which of the following ways?

- 1. Eliminating the production of Hydrogen sulphide and Carbon dioxide in waste digestion
- 2. Reducing the energy footprint of waste treatment plants

Which of the above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) None

98. Which of these animals is/are likely to undergo hibernation?

- 1. Bats
- 2. Bees
- 3. Ground squirrels

Select the correct answer using the codes below.

- (a) 1, 2 and 3
- (b) 2 only
- (c) 1 and 3 only
- (d) 1 and 2 only

99. Traditional breeding techniques are not as efficient as genetically engineering techniques because

- 1. Gene exclusion can be controlled better in GE technique than breeding techniques.
- 2. Unlike GE, breeding requires a lot of time and results can be seen only after a long

time.

Which of the above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) None

100. A single nucleotide polymorphism, or SNP or “snip”, is a variation at a single position in a DNA sequence among individuals. Consider the following about SNP.

- 1. SNPs are critical to the functioning of genes because they SNPs are the primary drivers of protein creation in the body.
- 2. SNPs may lead to variations in the amino acid sequence.
- 3. SNPs are used in order to evaluate an individual's genetic predisposition to develop a disease.

Select the correct answer using the codes below.

- (a) 1 and 2 only
- (b) 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3