

Recent Developments in Physics

Multiple Choice Questions:

Question 1.

The method of making nanoparticles by breaking down bulk solids is called:

- (a) bottom up approach
- (b) top down approach
- (c) diagonal approach
- (d) cross down approach

Answer:

- (b) top down approach

Question 2.

Which one of the following is not the natural nanomaterial?

- (a) Peacock feather
- (b) Lotus leaf surface
- (c) A single strand of DNA
- (d) Grain of sand

Answer:

- (d) Grain of sand

Question 3.

The width of a single strand of DNA is about:

- (a) 3 nm
- (b) 5 nm
- (c) 30 nm
- (d) 50 nm

Answer:

- (a) 3 nm

Question 4.

In nano solid, the particle size is:

- (a) less than 1000 nm
- (b) less than 100 nm
- (c) greater than 100 nm
- (d) greater than 1000 nm

Answer:

- (b) less than 100 nm

Question 5.

Which one of the following is not synthesized by top down approach?

- (a) Plasma etching
- (b) Sol-gel
- (c) Lithography
- (d) Ball milling

Answer:

- (a) Plasma etching

Question 6.

Match List I with List II and then select the correct answer using the codes given below:

List - I	List - II
(i) Magnetic fluid	(A) Construction
(ii) Catalyst	(B) Medicine
(iii) Contrast medium	(C) Chemical industry
(iv) Flame retardants	(D) Automotive industry

Codes:	(i)	(ii)	(iii)	(iv)
(a)	(C)	(D)	(B)	(A)
(b)	(B)	(A)	(C)	(D)
(c)	(D)	(B)	(A)	(C)
(d)	(A)	(C)	(D)	(B)

Answer:

- (a)

Question 7.

Match List I with List II and then select the correct answer using the codes given below:

List I	List II
(i) Additives	(A) House hold
(ii) Odors Catalyst	(B) Chemical industry

(iii) Skin creams	(C) Food and drinks
(iv) Switchable adhesives	(D) Cosmetics

Codes:	(i)	(ii)	(iii)	(iv)
(a)	(A)	(D)	(C)	(B)
(b)	(D)	(B)	(A)	(C)
(c)	(C)	(A)	(D)	(B)
(d)	(A)	(C)	(B)	(D)

Answer:

(c)

Question 8.

Protons and neutrons comprising the nucleon atom, which are made up of:

- (a) quarks
- (b) mesons
- (c) leptons
- (d) gluons

Answer:

(a) quarks

Question 9.

The adsorbing nature depends on of the nano particle.

- (a) surface
- (b) size
- (c) nature
- (d) bulk counter part

Answer:

(a) surface

Question 10.

Which of the following converts energy into movement?

- (a) Muscle wires
- (b) Sensors
- (c) Actuators
- (d) Pneumatic air muscles

Answer:

(c) Actuators

Question 11.

Black holes are the strongest source of:

- (a) electromagnetic waves
- (b) gravitational waves
- (c) light waves
- (d) heat waves

Answer:

- (b) gravitational waves

Subjective Question**Question 1.**

What is Nano science?

Answer:

Nano science is the science of objects with typical size 1 to 100 nm.

Question 2.

What is meant by Nano technology?

Answer:

Nano technology is a technology involving the design, production, characterisation and applications of nano structural material.

Question 3.

Name the two important phenomena given by nano properties.

Answer:

- (i) Quantum confinement effects.
- (ii) Surface effects.

Question 4.

What is the reason for self cleaning process in lotus leaf?

Answer:

Lotus leaf surface scanning electron micrograph showing the nano structures on the surface of a leaf from a lotus plant. This is the reason for self cleaning process in lotus leaf.

Question 5.

How do you synthesis nano particles?

Answer:

There are two ways of preparing the nanomaterials, top down and bottom up approaches.

Question 6.

What is robotics?

Answer:

Robotics is an integrated study of mechanical engineering, electronic engineering, computer engineering and science.

Question 7.

What are the different types of Robot locomotion?

Answer:

The different types are:

- Legged locomotion
- Wheeled locomotion
- Combination of legged and wheeled locomotion.
- Tracked slip / skid.

Question 8.

Write a note on precision medicine.

Answer:

Precision medicine is an emerging approach for disease treatment and prevention that takes into account individual variability in genes, environment and life style for each person.

Question 9.

Name the two important phenomena that govern by nano properties?

Answer:

Quantum confinement effects and surface effects are the two important phenomena that govern nano properties.

Question 10.

What are the specialized methods of preparing the nanomaterials.

Answer:

There are two specialized ways of preparing the nano materials, top down and bottom up approaches.

Question 11.

What is the aim of artificial intelligence?

Answer:

The aim of artificial intelligence is to bring in human like behaviour in robots.

Question 12.

What is cosmology?

Answer:

Cosmology is the branch that involves the origin and evolution of the universe. It deals with the formation of stars, galaxy etc.

Question 13.

How biomolecules and drugs delivered to a specific cell is achieved?

Answer:

The adsorbing nature depends on the surface of the nanoparticle. Indeed, it is possible to deliver a drug directly to a specific cell in the body by designing the surface of a nano particle so that it adsorbs specially onto the surface of the target cell.

Question 14.

Discuss the applications of nano materials in medicine.

Answer:

The applications of nano materials medicine are:

1. Medical rapid tests
2. Drug and biomolecules delivery system
3. Agents in cancer therapy
4. Contrast medium
5. Active agents
6. Antimicrobial agents and coating
7. Prostheses and implants.

Question 15.

List out the applications of nano materials in sports.

Answer:

- Ski wax
- Antifogging of glasses
- Antifouling coatings for ships / boats
- Reinforced tennis rackets and balls

Question 16.

Explain the following with examples.

(i) Top down approach.

(ii) Bottom up approach.

Answer:

(i) Top down approach:

Nano materials are synthesised by breaking down bulk solids into nano sizes, eg: Ball milling, sol-gel, lithography.

(ii) Bottom up approach:

Nano materials are synthesised by assembling the atoms / molecules together.

Selectively atoms are added to create structures.

eg: Plasma etching and chemical vapour deposition.

Question 17.

How virtual reality is used in medical field?

Answer:

Medical virtual reality is effectively used to stop the brain from processing pain and cure soreness in the hospitalized patients. Virtual reality has enhanced surgeries by the use of 3D models by surgeons to plan operations. It helps in the treatment of Autism, memory loss and mental illness.

Question 18.

What are the usage of household and Industrial robots?

Answer:

(i) Household robots are used as vacuum cleaners, floor cleaners, gutter cleaners, lawn mowing, pool cleaning and to open and close doors.

(ii) Industrial robots are used for welding, cutting robotic water jet cutting, robotic laser cutting; lifting, sorting, bending, manufacturing, assembling packing, transport, handling hazardous materials like nuclear waste, weaponry, laboratory research, mass production of consumer and industrial goods.

Question 19.

What is gravitational waves? Name the sources of gravitational waves.

Answer:

Gravitational waves are the disturbances in the curvature of space-time and it travels with speed of light. Any accelerated mass emits gravitational waves which are very weak. Black holes are the strongest source of gravitational waves.

Question 20.

Write short notes on smart inhalers.

Answer:

asthma. Smart inhalers are designed with health systems and patients in mind so that they can offer maximum benefit. Smart inhalers use bluetooth technology to detect inhaler use, remind patients when to take their medication and gather data to help guide care.

Question 21.

Mention the applications of nano robots.

Answer:

The size of the nano robots is reduced to microscopic level to perform a task in very

small spaces. Nano robots in blood stream to perform small surgical procedures, to fight against bacteria, repairing individual cell in the body. An autonomous DNA robots to combat cancer tumours.

Question 22.

Write down some applications of nano technology in the field of medicine.

Answer:

1. Drug delivery system.
2. Active agents
3. Contrast medium.
4. Prostheses (an artificial body part) and implant.
5. Anti microbial agents and coating.
6. Agents in cancer therapy.

Question 23.

What is the role of nano technology in construction?

Answer:

- Thermal insulation and flame retardants.
- Surface functionalised building materials for wood floors, stone, facades, tiles, roof tiles etc.
- Facade coating
- Groove mortar.

Question 24.

list out five advantages of Robotics,

Answer:

1. Robot can work for 24×7 .
2. Stronger and faster than humans.
3. Robots are significantly used in handling material in chemical industries, in nuclear plants which can lead to health hazards in human.
4. It is more precise and error free in performing the task.
5. In warfare, robots can save human lives.

Question 25.

Mention some of recent advancement in medical technology.

Answer:

The recent advancement in medical technology includes.

1. Artificial organs
2. Smart inhalers

3. 3D printing
4. Robotic surgery
5. Wireless brain sensors
6. Virtual reality