Roll No. .....

Question Booklet Number

O. M. R. Serial No. | | | | | | | | |

M. Sc. (Biotechnology) (Fourth Semester)

EXAMINATION, July, 2022

(Elective)

NANO BIOTECHNOLOGY

Paper Code					
MBT	4	0	0	3	(D)

Questions Booklet Series
D

Time : 1:30 Hours] [*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) (शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. Self-assembled closed colloidal structures composed of lipid bilayers are called as _____.

(A) dendrimers

(B) polymers

(C) micelles

(D) liposomes

2. ASTM stands for :

(A) American Standard for Testing and Materials

(B) American Society for Testing and Materials

(C) Advanced Society for Testing and Materials

(D) Advanced Standard for Testing and Materials

3. Select the incorrect statement from the following options :

(A) Self-assembly is a top-down manufacturing technique.

(B) In self-assembly, weak interactions play very important role.

(C) Self-assembling molecules adopt an organised structure which is thermodynamically more stable than the single, unassembled components.

(D) Compared to the isolated components, the self-assembled structure has a higher order.

4. In Nanotechnology, F_1-ATPase complex is an example of _____.

(A) protein

(B) enzyme

(C) molecular motor

(D) ATP

5. _____ is used to measure nanoparticles induced apoptosis.

(A) Colony formation assay

(B) MTT assay

(C) WST assay

(D) Caspase-3 activity

6. The criteria for the selection ideal polymer :

(A) Biocompatible

(B) Biodegradable

(C) Non-immunogenic

(D) All of the above

7. 'OECD' stands for :

(A) Organisation for Economic Cooperation and Development

(B) Organisation for Ecosystem Cooperation and Development

(C) Outlet for Economic Cooperation and Development

(D) Outsourcing for Economic Cooperation and Development

8. Nanoshells are used in the treatment of which of the following diseases ?

(A) Alzheimer's

(B) Cancer

(C) HJV

(D) Parkinson's

9. Carbon nanotubes coated with cisplatin and folic acid is an example of _____ targetted drug delivery.

(A) Passive

(B) Active

(C) Both of the above

(D) None of the above

10. TEM is _____.

(A) Transmission Electron Microscope

(B) Transmit Electron Microscope

(C) Transmission Electrical Microscope

(D) Transmit Electrical Microscope

11. These non-invasive techniques have been used for drug delivery to brain :

(A) Nanogels

(B) Bradykinin administration

(C) Onmaya reservoir

(D) Microgel

12. Those who handle nanostructured powders run the risk of :

(A) Aerosolization

(B) Agglomeration

(C) Polymerization

(D) Acidification

13. Which metal is used with nanoparticles for antibiotic delivery ?

(A) Gold

(B) Titanium

(C) Zinc

(D) Silver

14. Expand BECON :

(A) Biomedical Engineering Consortium

(B) Biomedical Financing Administration

(C) Biomedical Elite Consortium

(D) Biomedical Engineering Administration

15. Which of these biosensors use the principle of heat released or absorbed by a reaction ?

(A) Potentiometric biosensor

(B) Optical biosensors

(C) Piezoelectric biosensors

(D) Calorimetric biosensors

16. The 1996 Nobel Prize in Chemistry to Harold W. Kro to, Robert F. Curl and Richard E. Smalley was for their discovery of _____ in 1985.

(A) bucky balls

(B) fullerenes

(C) nanotubes

(D) nanowires

17. In 1986, Dr. K. Eric Drexler published a book for the layman that gave a wide overview of the potential applications of molecular nanotechnology in such areas as computing, medicine, space science and the military. What was the name of this ground-breaking book ?

(A) Smaller is Better

(B) Engines of Creation

(C) A Crowded Blueprint

(D) The Atomic Cookbook

18. The term 'nanotechnology' was first coined by :

(A) Richard Smalley

(B) Norio Taniguchi

(C) K. Eric Drexler

(D) Richard Feynman

19. 20 micron = _____ nm.

(A) $20 \times 10^{(-9)}$

(B) 20×10^{9}

(C) 200

(D) 20000

20. Who is generally credited with the first serious scientific claim that manufacturing on the molecular or even the atomic scale was possible ? The claim was made at California Technical Institute and was called, "There's Plenty of Room at the Bottom" :

(A) Richard P. Feynman

(B) Ed Regis

(C) K. Eric Drexler

(D) Ralph Merkle

21. A closed cage structure of icosahedral symmetry with 20 hexagonal and 12 pentagonal rings are called as _____.

(A) crystals.

(B) fullerenes.

(C) carbon balls.

(D) nanoparticles.

22. Expand CNT :

(A) Copper Nano Tube

(B) Carbon Nano Tube

(C) Cell Nano Tube

(D) Crystal Nano Tube

23. Nanomaterials can confer cytotoxicity by :

(A) Generating free radicals

(B) Disrupting membrane potential

(C) Promoting apoptosis

(D) All of the above

24. Expand SPM :

(A) Scanning Probe Microscope

(B) Surface Pointed Microscope

(C) Surface Prime Microscope

(D) Scattering Probe Microscope

25. STM cannot be used for :

(A) Imaging

(B) Topology

(C) Surface structure

(D) Chemical analysis

26. Topography means :

(A) The surface feature of an object

(B) The shape and size of a particle

(C) Element composition

(D) Chemical analysis

27. Nano sized polymers built from branched units are called :

(A) Dendrimers

(B) Composites

(C) Carbon-based materials

(D) Metal-based materials

28. Which of the following is not a characteristic of the immobilized enzymes ?

(A) They cannot be re-used

(B) It produces reproducible results

(C) Stability exists

(D) Same catalytic activity is present for number of analysis

29. The colour of the nano gold particles is :

(A) Yellow

(B) Orange

(C) Red

(D) Variable

30. SEM cannot be used for :

(A) Imaging

(B) Topology

(C) Morphology

(D) Crystal structure

31. Natural Hydrophilic polymer includes :

(A) Gelatin

(B) Albumin

(C) Vicillin

(D) All of the above

32. Which of the following is an example of bottom-up approach for the preparation of nanomaterials ?

(A) Etching

(B) Colloidal dispersion

(C) Lithography

(D) Erosion

33. Nanopores are made up of _____.

(A) carbon.

(B) gold.

(C) titanium.

(D) silicon.

34. Nanopore sequencing is a method for determining the order in which nucleotides occur on a strand of _____.

(A) RNA

(B) DNA

(C) cDNA

(D) snRNA

35. What is the procedure in Top-down fabrication method ?

(A) Nanoparticles > Powder > Bulk

(B) Powder > Bulk > Nanoparticles

(C) Bulk > Powder > Nanoparticles

(D) Nanoparticles > Bulk > Powder

36. What are the approaches used in nanofabrication ?

(A) Top-up

(B) Bottom down

(C) Both (A) and (B)

(D) Neither (A) nor (B)

37. Terrestrial plant species recommended for ecotoxicity assessment of nanoparticle by standard guidelines is :

(A) *Cucumis sativus* (cucumber)

(B) Duckweed

(C) *Ceramium tenuicorne*

(D) *Lymnaea stagnalis*

38. Some nanomaterial like silver and gold nanoparticle with the _____ group of the protein without use of linker.

(A) Thiol

(B) Phenol

(C) Both (A) and (B)

(D) None of the above

39. CNTs are the strongest and stiffest materials in :

(A) Tensile strength

(B) Ductility

(C) Elasticity

(D) Energy

40. Which statement is incorrect about Nanomaterial ?

(A) With the ongoing commercialization of nanotechnology products, human exposure to nanoparticles will dramatically increase, and an evaluation of their potential toxicity is essential.

(B) A number of manufactured nanoparticles have recently been shown to cause adverse effects *in-vitro* and *in-vivo.*

(C) Still it is unclear whether the exposure of humans, animals, insects and plants to engineered nanostructures could produce harmful biological responses.

(D) Nanomaterial are safe for humans so therefore no need to evaluate its toxicity.

41. In 1969, _____ defined the term "ecotoxicology" as "the branch of toxicology concerned with the study of toxic effects, caused by natural or synthetic pollutants, to the constituents of ecosystems, animal, vegetable and microbial, in an integral context".

(A) René Truhaut

(B) Eric Loafer

(C) Henry Stewart

(D) Ernst Haeckel

42. Nanoparticles of iron oxide–called "nanorust"–can be used to :

(A) remove bacteria from washing machines

(B) desalinize seawater

(C) remove toxic arsenic from drinking water

(D) kill cockroaches

43. Nanodevices use _____ to move linearly by rotation.

(A) ATP

(B) electricity

(C) motor proteins

(D) ADP

44. Which statement is incorrect about Natural nanoparticles and their possible safety concerns ?

(A) Nanoparticles in nature that occur in free form quickly tend to agglomerate and thus leave their nanoforms and stop being a danger to organisms.

(B) Animal studies have shown that natural nanoparticles can penetrate cells and tissues.

(C) These may move through the body, reach vital organs like brain and cause biochemical damage and even cancer.

(D) Nature itself presents many nanoparticles to which organisms on earth may have not evolved immunity.

45. Spherical gold nanoparticles are _____ dimensional nanomaterials.

(A) Zero

(B) One

(C) Two

(D) Three

46. Which of the following is not an application of fullerenes ?

(A) Organic photovoltaics

(B) Antioxidants

(C) Additives

(D) Imaging

47. Nanocatalysts for catalytic chemical reactions mainly include :

(A) the oxidation reaction

(B) the reduction reaction

(C) the electrochemical reaction

(D) All of the above

48. Nanoparticles target the rare _____ causing cells and remove them from blood.

(A) Tumour

(B) Fever

(C) Infection

(D) Cold

49. When was the first biosensor was invented ?

(A) 1956, Leland Clark

(B) 1962, Clark and Lyon

(C) 1935, Leland Clark

(D) 1957, Clark and Lyon

50. What is the Enhanced Permeability and Retention (EPR) effect ?

(A) The retention of the nanoparticules inside the vessel wall.

(B) An enhanced permeability of the vessel wall at the tumor site due to an abnormal organization of the endothelium.

(C) The enhancement of life time of the nanoparticles in the blood flow.

(D) A leaky plasma membrane.

51. An advantage of nanobased drug delivery systems is :

(A) it causes fluctuation of blood levels.

(B) it cannot be target specific.

(C) it increases toxicity of the drug.

(D) it reduces side effects of the drug.

52. Use of monoclonal antibodies for drug delivery to tumors is :

(A) active targeting

(B) passive targeting

(C) triggered drug targeting

(D) vector targeting

53. *In-vitro* nanotoxicity data are primarily based on :

(A) Cell lines based testing

(B) Animal based testing

(C) Clinical testing

(D) Organ based testing

54. Nanoparticles are surface functionalized for :

(A) Preventing aggregation

(B) Specific drug targeting

(C) Diagnosis and sensing

(D) All of the above

55. _____ is the oxidative degradation of cell membranes initiated by the presence of ROS, and is most commonly measured by assaying the presence of malondialdehyde or other thiobarbituric acid reactive substances.

(A) Lipid peroxidation

(B) Neutral red assay

(C) 2, 7-dichlorofluorescin (DCFH) assay

(D) Neutral red assay

56. The main reason why nanomaterials have attracted so much attention in catalysis is that they are a bridge between atoms and bulk materials. In addition, they have some special properties, such as :

(A) Surface and interface effect

(B) Small size effect

(C) Quantum size effect

(D) All of the above

57. A nanobiological recognion component, which is involved in interacting with the analyte molecule is called as _____.

(A) Antibodies

(B) Aptamers

(C) DNA probe

(D) RNA probe

58. Which amongst these is a limitation associated with conventional drug delivery systems ?

(A) Lower effectiveness

(B) Ease of manufacturing

(C) Decreased side effects

(D) Spatial and temporal control

59. Quantum tunnel effect can be defined as :

(A) When the total energy is less than the barrier height, extremely small crystals can still passes through the barrier.

(B) When the total energy is more than the barrier height, extremely small crystals can still passes through the barrier.

(C) When the total energy is equal than the barrier height, extremely small crystals can still passes through the barrier.

(D) When the total energy is more than the barrier height, extremely large crystals can still passes through the barrier.

60. Nanomaterials can confer cytotoxicity by :

(A) Generating free radicals

(B) Disrupting membrane potential

(C) Promoting apoptosis

(D) All of the above

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is ny discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।