

Ph. D. Entrance Test – 2015**Subject: Nanoscience and Nanotechnology****Paper – I**

Important: Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No. **In Figure** **In Words**

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: _____

Signature of Invigilator: _____

Time: 60 Minutes **Number of Questions: 50** **Maximum Marks: 50**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

- Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
- Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen**.
- Do not make any identification mark on the Answer Sheet or Question Booklet.
- Please check that this Question Booklet contains **50** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
- Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**. **There shall be no negative marking for wrong answers.**
- If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
- Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
- If you want to change an already marked answer, erase the shade in the darkened bubble completely.
- For rough work only the blank sheet at the end of the Question Booklet be used.
- The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
- After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
- In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
- A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
- Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
- The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

(1075)

1. Stem cells have the property of
A) Regeneration
B) Differentiation into organs
C) Growth and division
D) All of the above
2. Origin of T cells is in the
A) Thymus
B) RBC
C) WBC
D) Thyroid
3. Enzyme-substrate kinetics can be studied via
A) Stern Volmer plots
B) DFT calculations
C) Michaelis Menten Kinetics
D) none of the above
4. With decreasing size, the surface to volume ratio in nanomaterials
A) Increases
B) Decreases
C) Remains same
D) Depends upon the nanomaterials
5. The medicine used to prevent graft rejection is
A) Thrombin
B) Cyclosporin
C) Penicillin
D) Crocin
6. The chemical secreted during allergy is
A) Histamine
B) Oxytocin
C) Prolin
D) All of these
7. The technique used to study hydrodynamic size distribution in nanoparticle solutions is:
A) TEM
B) SEM
C) Dynamic Light Scattering
D) AFM
8. Generation of carboxylic groups on the surface of CNTs renders them
A) Hydrophilic
B) Hydrophobic
C) Non toxic
D) Smaller in size
9. XRD gives information on the
A) Size of crystallite
B) Conductivity
C) Size distribution
D) Color
10. Infra red spectroscopy is complimentary to
A) Mass
B) NMR
C) GC
D) Raman
11. Which of the following statements is true
A) Addition of nanomaterials to composites decreases their stability
B) Addition of nanomaterials to composites increases their stability
C) None of the above
D) Both A and B

12. Which of the following is an aromatic amino acid
 A) Tyrosine B) Glutamic acid C) Arginine D) Cysteine
13. Quantum confinement leads to
 A) Continuous energy bands B) Discrete energy levels
 C) Increase in size D) All of the above
14. Particle morphology can be studied via
 A) Raman B) Mass C) SEM D) HPLC
15. On addition of large amounts of electrolyte, the color of gold nanoparticles changes from
 A) Blue to red B) Red to blue C) Red to yellow D) Yellow to red
16. Which class do quantum dots belong to
 A) 0-D B) 1-D C) 2-D D) 3-D
17. What does EPR stand for
 A) Electron paramagnetic resonance B) Electron proton resonance
 C) Energy paramagnetic resonance D) Energy proton resonance
18. For a reversible process at constant temperature, pressure, the surface energy is equal to
 A) $\gamma = \left(\frac{\partial G}{\partial A}\right)_{P, T}$ B) $\gamma = \left(\frac{\partial G}{\partial V}\right)_{P, T}$
 C) $\gamma = \left(\frac{\partial G}{\partial A}\right)_{V, T}$ D) $\gamma = \left(\frac{\partial A}{\partial G}\right)_{P, T}$
19. ECG stands for
 A) Electrocephalogram B) Electrocardiogram
 C) Electrocardiacgram D) Electrocardiogram
20. Out of the following which are more toxic
 A) Keratin B) Gold nanoparticles
 C) CNTs D) Liposomes
21. Dendrimers are
 A) Tree type structures B) Phospholipids
 C) Quantum dots D) None of the above
22. Targeted drug delivery can be done by using
 A) Only drug labelled nanoparticles B) FITC labelled nanoparticles
 C) Antigen labelled nanoparticles D) Antibody labelled nanoparticles

23. The stabilization of metal ion by ligands that donate electron pairs to vacant metal orbitals is called
- A) Chemical bonding
B) Dative bonding
C) Hydrogen bonding
D) Electrostatic bonding
24. HR-TEM refers to
- A) High range TEM
B) High resolution TEM
C) Hollow range TEM
D) Hollow resolution TEM
25. Color of copper nanoparticles is
- A) Blue
B) Green
C) Red
D) Yellow
26. Metal Nanoparticles prepared using sodium borohydride are
- A) Small
B) Large
C) Heterodisperse
D) No. reduction at all
27. The method used to prepare silica nanoparticles is called
- A) Langmuir process
B) Stober process
C) Freundlich process
D) Michaelis process
28. An example of intensive property is
- A) Internal energy
B) Gibbs free energy
C) Helmholtz free energy
D) Entropy
29. Surfactants are
- A) Surface active agents
B) Surface enhancing agents
C) Surface deactivating agents
D) All of these
30. An example of circadian rhythm is
- A) Day and night rythm
B) Musical rythm
C) Both of above
D) None of these
31. Van der Waals interaction does not include
- A) Dipole dipole forces
B) Ion induced dipole forces
C) Dipole induced dipole forces
D) Ion reduced dipole forces
32. The easiest route of metal nanoparticle synthesis is
- A) Brust method
B) Frens method
C) Schriffin method
D) All of these
33. Surface plasmon resonance depends upon
- A) Shape of the material
B) Refractive index of medium
C) Size of the material
D) All of the above

34. The protein molecules having aromatic amino acids will absorb at which wavelength?
 A) 360 nm B) 190 nm C) 280 nm D) 520 nm
35. As the size of the quantum dot increases, the peak maxima
 A) Increases B) Decreases
 C) Remains the same D) Depends on the quantum dot
36. CMC stands for
 A) Chemical micellar concentration B) Critical micellar concentration
 C) Critical melting concentration D) Chemical micellar concentration
37. Critical nucleus size in nanomaterials is small for
 A) Low supersaturation B) High supersaturation
 C) Low saturation D) High saturation
38. Which of the following polymers can regain their original shape?
 A) Thermoplastic only B) Thermo setting only
 C) Elastomer only D) Thermoplastic and elastomer
39. High concentration of citrate rapidly stabilizes AuNPs of... .. sizes.
 A) Large B) Uneven C) Small D) None of these
40. LB films refer to
 A) Langmuir blodgett films B) Lorentz Blodgett films
 C) Langmuir boltz films D) Lorentz boltz films
41. To measure the concentration of the antigen, which type of ELISA is used
 A) Sanwich ELISA B) Direct ELISA
 C) Competitive ELISA D) Indirect ELISA
42. Fluctuations in nanosystems are
 A) Significant B) Non-significant
 C) Significant only at certain conditions D) There are no fluctuations in nanosystems
43. Lyophilic sols are more stable than lyophobic sols.
 A) True B) False
 C) Both are unstable D) May or may not be true
44. The net charge at the slipping plane for double layer theory is known as
 A) Net potential B) Zeta potential
 C) Electrophoretic potential D) Isoelectric point

45. Catalysts lower the _____ of a reaction.
A) Potential B) Stability C) Conductivity D) Activation energy
46. Which instrument can be used to measure the surface charge of the nanoparticles solutions?
A) Zeta sizer B) AFM C) CV D) All of these
47. DNA absorbs at which wavelength?
A) 290 nm B) 260 nm C) 280 nm D) 520 nm
48. Dielectric constant is based on the phenomenon of
A) Resistivity B) Conductivity C) Permittivity D) Relativity
49. Which of the following is a cationic surfactant
A) SDS B) AOT C) CTAB D) All of these
50. A specialized form of metal coordination binding that involves a molecule with at least two binding sites on ligands is called
A) Chelation B) Ligand stabilised cluster binding
C) Supramolecular binding D) All of the above

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