M/P ENT - 120

Total No. of Pages : 8

Seat No.	

M.Phil./Ph.D. Entrance Examination, August - 2018
NANOSCIENCE AND TECHNOLOGY

Day and Date : Wednesday, 08 - 08 - 2018 **Total Marks : 100**
Time : 4.00 p.m. to 6.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Each question carries 2 marks.**
3) **Answers should be marked in the given OMR answer sheet by darkening the appropriate option.**
4) **Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.**
5) **Follow the instructions given on OMR Sheet.**
6) **Rough work shall be done on the sheet provided at the end of question paper.**
7) **Only non programmable calculators are allowed.**

1) Research is _____ .
   A) Finding solution to any problem
   B) Searching again and again
   C) Working in a scientific way to search for truth of any problem
   D) None of the above

2) Which of the following is the first step in starting the research process?
   A) Identification of problem
   B) Survey of related literature
   C) Searching sources of information to locate problem
   D) Searching for solutions to the problem

3) A research paper is a brief report of research work based on
   A) Primary Data only B) Secondary Data only
   C) Both Primary and Secondary Data D) None of the above

4) In the research where the primary data is collected through survey, data can be collected by _____ .
   A) Observation B) Through personal interview
   C) Through telephone interview D) Any one of above

5) Experimentation is done to test _____ .
   A) Research Technics
   B) Hypothesis
   C) Research method
   D) All of the above

6) Latin square design is the part of _____ Design.
   A) Experimental design
   B) Informal design
   C) Formal design
   D) All of the above

7) What is long form of APA in APA' s ethical principles?
   A) American Psychological Association
   B) African Psychological Association
   C) American Psychological Arrangement
   D) African Psychological Arrangement

8) Research objectives falls into a number of categories that include _____.
   A) Planning to get answers for what, why & where type of questions.
   B) Exploratory, descriptive, diagnostic and experimentation research.
   C) Considering the logic behind the methods we use in the context of the research.
   D) Formulative, concept, and planning for research methods.

9) What is a research design?
   A) A way of conducting research that is not grounded in theory.
   B) The choice between using qualitative or quantitative methods.
   C) The style in which you present your research findings, e.g. a graph.
   D) A framework for every stage of the collection and analysis of data.

10) The role of a project supervisor is to:
   A) Give you a reading list
   B) Provide academic support, guidance and critical feedback on your work.
   C) Negotiate access to the research setting on the student's behalf.
   D) Ensure you keep to your schedule and deadlines.

11) According to principle of _____ , the variability is made to vary deliberately over as wide range as necessary and this need to be done in such a way that variability it causes can be measured and hence eliminated from experimental error:
   A) Randomization
   B) Replication
   C) Error analysis
   D) Local control

12) The name of _____ Scientist is associated with the principles of experimental design.
A) Einstein B) Fisher
C) Newton D) De broglie

13) Which of the following uses radio frequency to produce nano particles?
A) Plasma arching B) Chemical vapour deposition
C) Sol-gel technique D) Electro deposition

14) Which of the following is used to make both nano particles and nano powders?
A) Chemical vapour deposition B) Sol-gel technique
C) Plasma arching D) Electro deposition

15) The angle between [111] and [11–2] directions in a cubic crystal is (in degrees).
A) 0 B) 45
C) 90 D) 180

16) Infrared spectroscopy provides valuable information about.
A) Molecular weight B) Melting point
C) Conjugation D) Functional groups

17) Which of the following statement about Transmission Electron Microscopy is not true.
A) The specimen must be stained with osmium or other heavy metal
B) The specimens are placed in a high vacuum for viewing
C) The specimens must be sliced very thin, 20-100 nm in thickness
D) The beam is focused by electromagnetic lenses

18) Monochromatic (one color) light is sometimes used to increase the resolution of light microscopes. Light of which color below would give you the best resolution?
A) Red B) Orange
C) Green D) Blue

19) In infrared spectroscopy which frequency range is known as the fingerprint region?
A) 400 - 1400cm -1 B) 1400 - 900cm -1
C) 900 - 600cm -1 D) 600 - 250cm -1

20) Which of the following wavelength ranges is associated with UV spectroscopy?
A) 0.8 - 500 μm
B) 400 - 100nm
C) 380 - 750nm
D) 1-10nm

21) Which technique(s) is (are) commonly used to determine the quality of epitaxial growth of thin films?
A) X - ray diffraction
B) Reflection high energy electron diffraction
C) Transmission high energy electron diffraction
D) Reflection low energy electron diffraction

22) For which conditions will a thin film have larger grains?
A) High deposition rate and high substrate temperature
B) High deposition rate and low substrate temperature
C) Low deposition rate and high substrate temperature
D) Low deposition rate and low substrate temperature

23) What does "critical thickness" mean in epitaxial films?
A) Minimum thickness of defect- free layer
B) Thickness of substrate needed for epitaxial growth of film on it
C) Maximum thickness of defect- free layer
D) The film lattice would compensate for dislocation defects above this thickness

24) Which of the following statements is consistent with an electronic absorption being broad?
A) Hydrogen bonding causes an electronic absorption to be broad
B) Electronic transitions are always localized on a single atomic centre
C) The absorption of a photon is slower than the timescale of molecular vibrations.
D) An electronic absorption includes vibrational and rotational structure

25) The transition zone for Raman spectra is
A) Between vibrational and rotational levels
B) Between electronic levels
C) Between magnetic levels of nuclei
D) Between magnetic levels of unpaired electrons

26) Two major steps involved in clay particle dispersion in polymers to prepare nanocomposites.
A) Intercalation and exfoliation B) Melting and boiling
C) Freezing and heating D) None of these

27) A smaller magic cluster contains _____ .
A) 1 atom B) 15 atoms
C) 55 atoms D) 13 atoms

28) Nanotubes arrays can be synthesized using _____ electrolyte in first generation.
A) Buffered B) Aqueous
C) Organic electrolytes D) HF electrolytes

29) _____ are allotropes of carbon with cylindrical nanostructure.
A) Coal B) Fullerene
C) Diamond D) Carbon nanotube

30) _____ high temperature method for the synthesis of carbon nanotube.
A) Arc discharge B) Chemical vapour deposition
C) Laser ablation D) All of the above

31) Which are the physical methods for the purification of carbon nanotubes?
A) Filtration B) Chromatography
C) Sonication D) All of the above

32) For p-channel MOSFET, E-mode exists when VGS is,
A) Positive B) Negative
C) Zero D) None of the above

33) In piezoelectric effect, piezo stands for,
A) Temperature B) pressure
C) volume D) Electric field

34) In Gunn diode semiconductor can be of the type,
A) Only P-type B) Only n-type
C) p and n-type D) None of the above

35) Thermodynamics of adsorption and desorption of molecules is described by
A) Langmuir isotherm
B) Freundlich isotherm
C) Brunauer-Emmett-Teller measurement
D) All of the above

36) Which statement on the dependence of rate of a reaction on temperature is true?
A) Rate of reaction is inversely proportional to the temperature
B) Rate of reaction is exponential function of temperature
C) Rate of reaction is directly proportional to temperature
D) Rate of reaction increases to two folds for every 10°C increased in temperature

37) BET deals with
A) Monolayer adsorption
B) Bilayer adsorption
C) Multilayer adsorption
D) None of the above

38) Which of the example(s) are correct "as scale reduces the coating becomes the product"?
A) GMR thin film heads
B) MEMS
C) Fuel cells
D) All of the above

39) The right contact angle for hydrophobic and superhydrophobic coating material is
A) > 90° and > 150°
B) < 90° and < 150°
C) Both (A) and (B)
D) None of the above

40) Nanocoatings have great future because _____.
A) It delivers things that cannot be delivered by simple coatings.
B) It provide opportunities for profitable growth
C) Both (A) and (B)
D) None of the above

41) SPL stands for
A) Scanning probe lithography
B) Scanning pen lithography
C) Scanning protein lithography
D) Scanning pulse lithography

42) DNA is considered as a best candidate for molecular machines due to
A) Unique property of molecular recognition
B) Unique mechanical properties
C) Both
D) None

43) The sample for nanoarrays can be
A) cDNA B) Proteins
C) Both D) None

44) Tweezers, PX-JX_2 rotors, DNA walkers are part of
A) DNA nanomachines B) Carbon nanotubes
C) Biochip D) None

45) Size selective precipitation method is useful to achieve_____particles in colloidal solution.
A) Smaller size B) Larger size
C) Equal size D) Less than 10 nm

46) CdSe small size cluster emits_____ light.
A) Green B) Blue
C) Red ∝ D) Yellow

47) Which of the following is /are photocatalyst.
A) TiO_2 B) ZnO
C) Fe_2O_3 D) All of the above

48) The integrated rate equation for a first order reaction is given by?
A) Velocity [A]/dt B) Rate = k [A]
C) In [A] = $[A]_0$ e^{-kt} D) None of the above

49) The term nanodiagnostics was first coined by
A) Jain (2003) B) Jain (2006)
C) Feynman (2003) D) None

50) The surface groups in dendrimers can be
A) Reactive groups B) Biomarkers
C) Target directing group D) All

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Rough Work