M/P ENT - 134

Total No. of Pages : 8

Seat No.	

M.Phil./Ph.D. Entrance Examination, October - 2021
NANO-SCIENCE AND TECHNOLOGY

Day and Date : Thursday, 28 - 10 - 2021 **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 markint 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) In which type of peer review process editor knows author but authors do not know who the reviewers are?
   A) Single blind
   B) Double-blind
   C) Open review
   D) None of the above

2) Literature survey provides answers to which of the following questions?
   A) Who is the pioneer in your research area?
   B) Which are the key or popular papers/review articles in this field?
   C) Which papers belong to or matches with your project?
   D) All of the above

3) In the structure of a review article which of the following is different from other publishing types?
   A) Conclusions and future outlooks
   B) Title
   C) Introduction
   D) Abstract

4) A reasoning where we start with certain particular statements and conclude with a universal statement is called _____.

A) deductive reasoning
B) inductive reasoning
C) abnormal reasoning
D) transcendental reasoning

5) In the process of conducting research 'Formulation of Hypothesis" is followed by

A) statement of objectives
B) analysis of data
C) selection of research tools
D) collection of data

6) Which of the following is the first step in starting the research process?

A) searching sources of information to locate problem
B) survey of related literature
C) identification of problem
D) searching for solutions to the problem

7) Area sampling is quite close to cluster sampling and is often talked about when the total _____ area of interest happens to be big one.

A) Field
B) Geographical
C) Morphological
D) Remaining

8) In case of social research, it is considered advisable to do some field observation and as such the researcher may undertake some sort of preliminary survey or what is often called _____ survey.

A) Short
B) Immediate
C) Pilot
D) Rapid

9) A researcher must discuss his problem with his colleagues and others who have enough experience in the same area or in working on similar problems. This is quite often known as an _____ survey.

A) Knowledge
B) Easy
C) Mandatory
D) Experience

10) In single electron transistor _____ effect was observed.
A) Coulomb blockade B) Quantum confinement
C) Surface to volume ratio D) None of the above

11) In which of the following option the quantum tunnelling effect is absent.
A) Single electron transistor B) Esaki diode
C) Atomic force microscopy D) SWCNT

12) Which of the following element has the lowest mean free path of an electron?
A) Au B) Ag
C) Al D) Cu

13) Which of the following object indicates natural nanomaterials.
A) Lotus leaves B) Fe_2O_4 nanoparticles
C) CNT D) Au nanoparticles

14) The density of states is highest in the _____ nanomaterials.
A) 0D B) 1D
C) 2D D) 3D

15) The Surface Plasmon Resonance frequency of nanoparticles depends on
A) Size B) Band gap
C) Energy of photon D) Medium

16) Atwood's machine is an example of conservative system with_____ constraints.
A) Holonomic, rheonomous B) Holonomic, scleronomous
C) Holonomic, non Holonomic D) Non Holonomic, scleronomous

17) _____ is correct form of D' Alembert's principle.
A) $\Sigma(F_i^a + \dot{P}_i)\delta\gamma_i = 0$ B) $\Sigma(F_i^a + p_i)\delta\gamma_i = 0$
C) $\Sigma(F_i^a - \dot{P}_i)\delta\gamma_i = 0$ D) $\Sigma(F_i^a - p_i)\delta\gamma_i = 0$

18) For a rigid body moving parallel to a fixed plane surface, the number of degrees of freedom is _____.
A) Three B) One
C) Four D) Six

19) In quantum mechanics, the raising operator is given by _____ .

A) $L_+ = L_x + iL_y$ B) $L_- = L_x - iL_y$

C) $L_- = L_z + iL_y$ D) $L_- = L_z - iL_y$

20) Commutation relation $[L_x, y]$ = _____ .

A) $i\hbar x$ B) $i\hbar y$

C) $i\hbar z$ D) $-i\hbar z$

21) For 1 = 2, possible values of m_1 are _____ energy as those within the grains.

A) Two B) Three

C) Four D) Five

22) The lotus leaf is an example of _____ surface

A) hydrophilic B) hydrophobic

C) superhydrophilic D) superhydrophobic

23) When a capillary tube is dipped in a liquid , then the level of the liquid inside the tube rises because of _____ .

A) viscosity B) surface tension

C) osmosis D) diffusion

24) A dielectric material must be _____

A) resistor B) insulator

C) good conductor D) semi conductor

25) The angle of contact between pure water and clean glass is _____ .

A) 0° B) 45°

C) 90° D) 20°

26) The extent to which a liquid wets a given solid is called the _____ of the liquid for that solid.

A) surface tension B) elasticity

C) wettability D) contact angle

27) Self assembled closed colloidal structures composed of lipid bilayers are called as:

A) Dendimers B) Polymers

C) Micelles D) Liposomes

28) Nanopores are made up of
A) Carbon B) Gold
C) Titanium D) Silicon

29) PNA stands for
A) Protein Nucleotide B) Peptide Nucleic Acid
C) Peptide Nucleotide D) Peptide Nuclease acid

30) Mechanics and Electronics that are on the nanoscale are called as
A) MEM B) NEM
C) MEMS D) NEMS

31) Nanodevices use _____ to move linearly by motion.
A) ATP B) Electricity
C) Motor proteins D) ADP

32) MEMS does not necessarily require.
A) fluids B) chips
C) transducers D) signals

33) S Layer found in bacteria is made up of
A) phospholipid B) glycoproteins
C) glycolipids D) Liposomes

34) Which of the following polymers is prepared by condensation polymerization.
A) Teflon B) Nylon- 6, 6
C) Rubber D) Styrene

35) Which of the following is a thermosetting polymer?
A) Polystyrene B) Polyolefins
C) Nylons D) Phenolic resins

36) In additional polymerization, a monomer with double bond will simply.
A) Turn into single bond B) Remain same
C) Break D) Get rotated

37) Using more than one type of unsaturated monomer will produce a
A) co-polymer B) polyamides
C) polyesters D) polytone

38) Which of the following is the thermal method of analysis.
A) Differential scanning calorimetry
B) Colorimetry
C) Conductometery
D) Nuclear magnetic resonance spectroscopy

39) Rare gases are
A) Di atomic B) Tri atomic
C) Mono atomic D) None of above

40) The ratio of Mw/Mn in polymer chemistry is called as
A) Molecular weight B) Degree of polymerization
C) Polydispersity index D) Rate of polymerization

41) The glass transition temperature (Tg) of a polymer is the temperature at which the polymer.
A) Melts B) Become soft and rubbery
C) Degrades D) Vaporizes

42) Which of the following is an example of top-down approach for the preparation of nanomaterials?
A) Gas phase agglomeration B) Molecular self-assembly
C) Mechanical grinding D) Molecular beam epitaxy

43) At room temperature, the impure compound in crystallisation is.
A) Soluble B) Sparingly soluble
C) Insoluble D) None of the mentioned

44) The solution of impure compound and solvent is concentrated to get.
A) Unsaturated solution B) Undersaturated solution
C) Saturated solution D) Oversaturated solution

45) Crystal phases can be inter-converted by varying.

A) Temperature B) Pressure

C) Size D) Viscosity

46) The sources used in modern Raman spectrometry are nearly always _____.

A) Xenon Lamp B) Polychromatic source

C) LASER D) Tungsten Filament Lamp

47) The intensity of absorption band is always proportional to _____ .

A) Atomic population

B) Molecular population of initial state

C) Molecular population of final state

D) Molecular population of intermediate state

48) Electronics excitation is occur in the range of _____ .

A) 200 to 780 nm B) l00 to 500 nm

C) l00 to 700 nm D) 100 to 800 nm

49) The ratio of E-field vector & M-field vector equals to _____ .

A) Speed of light B) Frequency

C) Amplitude D) Wavelength

50) The Quantum of Energy is depends upon the _____ of radiation.

A) Intensity B) Phase

C) Magnitude D) Frequency

Rough Work