

Seat No.	
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M.Phil / Ph.D. Entrance Examination, September - 2019
Nanoscience and Technology (BOS-88)

Day and Date : Wednesday, 18 - 09 - 2019

Total Marks : 100

Time : 04.00 p.m. to 06.00 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) Quantitative research is based on the _____ measurements of some characteristics.
A) Qualitative
B) Quantitative
C) Qualitative or quantitative
D) Qualitative and quantitative

- 2) Research methodology is a way to systematically solve the _____.
A) Problems
B) Day today problem
C) Research problem
D) Any problem

P.T.O.

- 3) In the synopsis Why your research is still necessary? Need to mention under
- A) Introduction
 - B) Objectives
 - C) Significance of research
 - D) Literature survey
- 4) 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
- 5) The main characteristic of scientific research is
- A) Empirical
 - B) Theoretical
 - C) Experimental
 - D) All of the above
- 6) Research Problem is selected from the stand point of
- A) Researcher's Interest
 - B) Financial Support
 - C) Social Relevance
 - D) Availability of relevant literature
- 7) Formulation of Hypothesis may not be required in
- A) Survey method
 - B) Historical Studies
 - C) Experiments studies
 - D) Normative Studies

- 8) Bibliography given in research report
- A) Shows vast knowledge of researcher
 - B) Helps those interested in further research
 - C) Has no relevance to research
 - D) All of the above
- 9) _____ is the basis of scientific method.
- A) To test hypothesis in conduction that are conductive to its success
 - B) To formulate a research problem and disprove the hypothesis
 - C) To formulate a research problem, test the hypothesis in carefully controlled condition that are challenge the hypothesis
 - D) To test hypothesis and if they are disproved, they should be abandone
- 10) Inquisitiveness is the mother of knowledge. The method, which man employs for obtaining the knowledge can be termed as _____.
- A) Invention
 - B) Research
 - C) Education
 - D) Experiment
- 11) The main characteristic of _____ is that the research has no control over the variable.
- A) Experimental method
 - B) Laboratory method
 - C) Experience method
 - D) Descriptive method
- 12) Motivation Research is an important type of _____.
- A) Qualitative Research
 - B) Quantitative Research
 - C) Applied Research
 - D) Fundamental Research
- 13) Volt.cm.amp⁻¹.guass⁻¹ are the dimensions of _____.
- A) Boltzmann coefficient
 - B) Hall coefficient
 - C) Bloch coefficient
 - D) Einstein coefficient

- 14) The direction of Hall voltage is _____.
- A) Perpendicular to both applied electric field and magnetic field
 - B) Parallel to applied electric field
 - C) Perpendicular to applied magnetic field only
 - D) Perpendicular to applied electric field only
- 15) The kinetic energy operator is given by,
- A) $\hat{T} = i\hbar \frac{\partial}{\partial t}$
 - B) $\hat{T} = -\frac{\hbar^2}{2m} \nabla^2 + V$
 - C) $\hat{T} = \frac{\hbar^2}{2m} \nabla^2 - V(\mathbf{r})$
 - D) $\hat{T} = -\frac{\hbar^2}{2m} \nabla^2$
- 16) Momentum operator $\hat{p}_y =$ _____.
- A) $-i\hbar \frac{\partial}{\partial x}$
 - B) $-i\hbar \frac{\partial}{\partial y}$
 - C) $-i\hbar \frac{\partial}{\partial z}$
 - D) $i\hbar \frac{\partial}{\partial y}$
- 17) According to quantum statistics, size of cell should not be less than _____.
- A) h^3
 - B) h^2
 - C) h
 - D) $h/2$
- 18) For SEM following thing is required to capture an image _____.
- A) chamber
 - B) vacuum
 - C) electromagnetic wave
 - D) Magnetic field

- 25)** Which magnetic interaction is present GMR device when applied field is zero?
- A) Direct coupling
 - B) RKKY coupling
 - C) Indirect coupling
 - D) Complex coupling
- 26)** The magnetic nanomaterials are also called as
- A) Superparamagnetic
 - B) Suprimparamagnetic
 - C) Nano diamagnets
 - D) Nano ferromagnetic
- 27)** DNA Nanotechnology is based on
- A) Structural property of DNA
 - B) Genetic property of DNA
 - C) Functional property of DNA
 - D) Chemical Property of DNA
- 28)** The size of viruses ranges in between
- A) 10nm-20nm
 - B) 20nm-300nm
 - C) 300nm-600nm
 - D) 1nm-10nm
- 29)** Ion channels are made of
- A) Protein
 - B) Lipid
 - C) Carbohydrate
 - D) Fatty acid
- 30)** Nano-onions are related to
- A) Nanowires
 - B) Fullerenes
 - C) Nanoparticles
 - D) Gold nanorods
- 31)** Which of the following not a nanomaterial?
- A) DNA
 - B) Protein
 - C) Carbon nanotubes
 - D) Magnetic nanoparticle

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- 32) Which of the following is a well known bone repairing widely used in orthopaedics and dentistry?
- A) Dendrimer
B) Quantum dot
C) Titanium
D) None of the above
- 33) Nanomembranes have pore size of
- A) 1-10nm
B) 10nm-100nm
C) 0.1nm-1nm
D) 100nm-1000nm
- 34) Which one is a bio fertilizer?
- A) NPK mixture
B) Rhizobia in legume roots
C) Rhizobia in farmyard manure
D) Green manure
- 35) Which of the following *Plasmodium* parasite do not infect humans
- A) *Plasmodium falciparum*
B) *Plasmodium vivax*
C) *Plasmodium knowlesi*
D) *Plasmodium Indiana*
- 36) The term species was coined by _____.
- A) Aristotle
B) Linnaeus
C) John Ray
D) Engler
- 37) In melt intercalation method for preparation of polymer nanocomposites the polymer and filler are blended in which state?
- A) Dissolved state
B) Physically mixed state
C) Vapor state
D) Molten state

- 38)** Who is regarded as father of modern chemistry?
- A) Rutherford
 - B) Einstein
 - C) Lavoisier
 - D) C.V. Raman
- 39)** The hydroxyl groups present on the surface of silica particles are called as
- A) Silicate
 - B) Silanols
 - C) Siloxanes
 - D) Silanes
- 40)** The nanoparticles from iron and palladium are used to produce _____.
- A) Magnets
 - B) Magnetic lens
 - C) Magneto meters
 - D) Magnetic storage devices
- 41)** Which among the following statement is correct about heavy water?
- A) Both Melting point & Boiling Point of Heavy water are higher than normal water
 - B) Both Melting point & Boiling Point of Heavy water are lower than normal water
 - C) Melting point is higher and Boiling Point is lower than normal water
 - D) Melting point is lower and Boiling Point is higher than normal water
- 42)** Which among the following is a common salt in detergents?
- A) Sulphate
 - B) Nitrate
 - C) Sulphonate
 - D) Carbonate

- 43) The correct formula of magnetite nanoparticles is
- A) Fe_2O_3
 - B) Fe_3O_4
 - C) FeO
 - D) Fe_3O_6
- 44) _____ is an electromechanical device which convert sound waves into electrical signal.
- A) Microphone
 - B) Loud Speaker
 - C) Oscillator
 - D) Amplifier
- 45) All resistance in the order of _____ Ω are treated as high resistance
- A) 1Ω
 - B) 100Ω
 - C) $1 \text{ K}\Omega$
 - D) $1 \text{ M}\Omega$
- 46) In Maxwell Bridge the balance equation is independent of _____.
- A) Resistance
 - B) Capacitance
 - C) Frequency
 - D) Charge
- 47) Kelvin's bridge is used for measurement _____ Resistance.
- A) Low
 - B) High
 - C) Medium
 - D) Very High

- 48)** A basic bridge consist of _____ arms.
- A) One
 - B) Three
 - C) Four
 - D) Two
- 49)** If a function $y = f(x)$ has extreme value at a point $x=c$, then
- A) The derivative of $f(x)$ at $x = c$ must be non zero
 - B) The derivative of $f(x)$ at $x = c$ must be negative
 - C) The derivative of $f(x)$ at $x = c$ must be positive
 - D) The derivative of $f(x)$ at $x = c$ must be zero
- 50)** The system of linear equations $AX = B$ has unique solution only if
- A) The determinant of A is non-zero
 - B) The determinant of A is zero
 - C) The determinant of A is negative
 - D) The determinant of A is positive



Rough Work

Rough Work