



ENTRANCE EXAMINATION : ACADEMIC SESSION JANUARY 2020

PROGRAM: PhD (Biomaterials Science and Technology)

Time: 90 minutes

Max. Marks: 100

(Select the most appropriate answer)  
(There are no negative marks for wrong answers)

1. Name of the Launch Vehicle used in Chandrayaan-2
  - A. ROVER vehicle
  - B. PSLV
  - C. GSLV
  - D. ORBITOR
2. Symbol for S. I. Unit of temperature
  - A. °C
  - B. K
  - C. °F
  - D. All
3.  $10^{-12}$  is represented by
  - A. pico
  - B. tera
  - C. femto
  - D. peta
4. ISO stands for
  - A. Indian Standards Organization
  - B. International Organization for Standardization
  - C. International Standard Organization
  - D. Indian Organization for Standardization
5. Under the constitutional provisions, which authority has the power regarding the formation of new states or altering the boundaries of existing states?
  - A. Election Commission of India
  - B. Delimitation Commission of India
  - C. President of India
  - D. Parliament
6. Which of the following is depicted in a Two thousand rupees Indian currency note?
  - A. Rani ki vav
  - B. Mars planet
  - C. Chandrayaan
  - D. Sanchi Stupa
7. Who is the chairman of the Chiefs of Staff Committee?
  - A. General Bikram Singh
  - B. General Bipin Rawat
  - C. Admiral Karambir Singh
  - D. Air Chief Marshal Rakesh Kumar Singh Bhaduria

8. International Astronomical Union named a minor planet 2006 VP32 (number -300128), between Mars and Jupiter after the following Indian classical singer:
  - A. Pandit Jasraj
  - B. Pandit Ravi Shankar
  - C. Pandit Tansen
  - D. None of the above
  
9. 2020 Breakthrough prize goes to Scientists who first captured the image of
  - A. Pentacene molecule
  - B. Black hole
  - C. A rare form of carbon monoxide in the dust and gas disc around a young star.
  - D. Interstellar comet
  
10. Which among these are brain boosting nutrients?
  - A. Essential fatty acids
  - B. Vitamin C and B-complex
  - C. Amino acid
  - D. All of the above
  
11. Malala Yousafzai- an activist for education of women and children is also the youngest Nobel laureate. She hails from:
  - A. Iran
  - B. Syria
  - C. Jordan
  - D. Pakistan
  
12. The following is a palindrome:
  - A. DIVIDED
  - B. MALAYALAM
  - C. AQUA
  - D. DRESSED
  
13. Who is the ace Indian shuttler who is the first Indian to win Badminton World Championships gold:
  - A. Saina Nehwal
  - B. P.V. Sindhu
  - C. Sania Mirza
  - D. Mithali Raj
  
14. The following was demoted to the status of a 'dwarf planet' in 2006:
  - A. Uranus
  - B. Mercury
  - C. Pluto
  - D. Neptune
  
15. The following is the state bird of Kerala:
  - A. Great hornbill
  - B. Rufous treepie
  - C. Jungle babbler
  - D. Kingfisher
  
16. What does UNESCO stand for?
  - A. United Nations Economic, Socio-Cultural Organization
  - B. United Nations Educational, Scientific and Cultural Organization
  - C. United Nations Employment, Societal and Corporate Organization
  - D. None of the above

17. National Science Day is celebrated in India on 28 Feb every year in the memory of:
- A. Sir C.V. Raman
  - B. Dr. A.P.J. Abdul Kalam
  - C. Dr. Har Gobind Khorana
  - D. Dr. Srinivasa Ramanujan
18. India's highest civilian award Bharat Ratna for the year 2019 has been awarded to:
- A. Bhupen Hazarika
  - B. Pranab Mukherjee
  - C. Nanaji Deshmukh
  - D. All of the above
19. ISRO's mission Chandrayaan-2 has a lander named:
- A. Pragyan
  - B. Vikram
  - C. Dhawan
  - D. Sivan
20. Which of the following article of Constitution of India has been revoked recently?
- A. Article 330
  - B. Article 350
  - C. Article 370
  - D. Article 390
21. Pulitzer price established in
- A. 1917
  - B. 1922
  - C. 1928
  - D. 1918
22. Logo for World Wide Fund for nature
- A. Deer
  - B. Panda
  - C. Camel
  - D. Lion
23. The Flying Sikh of India
- A. Mohinder Singh
  - B. Joginder Singh
  - C. Yuvarag Singh
  - D. Milkha Singh
24. ISRO's most powerful rocket to date
- A. PSLV-XL
  - B. GSLV Mk-III
  - C. GSLV-Mach2
  - D. None of the above
25. Spaceflight that first landed humans on the Moon
- A. Apollo 11
  - B. Apollo 13
  - C. Apollo 8
  - D. Apollo 9

26. Manesh, the son of Arun is married to Sibi, whose sister Jisha is married to Hari, the brother of Manesh. How is Jisha related to Arun?
- A. Daughter in law
  - B. Cousin
  - C. Sister
  - D. Sister in law
27. The year in which the currency symbol of Indian rupee was adopted?
- A. 2000
  - B. 2010
  - C. 2020
  - D. None of the above
28. First Indian to Preside over the International Court of Justice?
- A. Nagendra Singh
  - B. Dr. Hardayal
  - C. Neeru Chadha
  - D. None of the Above
29. Nehru Cup was associated with:
- A. Snake Boat Race
  - B. Football
  - C. Hockey
  - D. Swimming
30. Founder of the Red Cross was?
- A. Henry Durant
  - B. Trigwilly H
  - C. Baden Powell
  - D. Frederick Parasse
31. What is the current population of India?
- A. 107 crores
  - B. 10.7 crores
  - C. 15.7 crores
  - D. 137 crores
32. Frances H. Arnold won the Nobel Prize in 2018 for:
- A. Chemistry
  - B. Physics
  - C. Economic Science
  - D. Medicine
33. The present Governor of Kerala
- A. P Sathasivam
  - B. R. L. Bhatia
  - C. Sheila Dikshit
  - D. Arif Mohammad Khan
34. A cuboid has six sides of different colours. The red side is opposite to black. The blue side is adjacent to white. The brown side is adjacent to blue. The red side is face down. Which one of the following would be the opposite to brown?
- A. Red
  - B. Black
  - C. White
  - D. Blue

35. Mangalyaan intend for
- Jupiter Orbiter Mission
  - Mars Orbiter Mission
  - Mercury Orbiter Mission
  - Saturn Orbiter Mission
36. Nanomaterials are materials of which a single unit is sized:
- < 100nm
  - < 1000nm
  - < 10nm
  - < 1nm
37. Of all the 3-digit numbers given below which one is divisible by 6?
- 149
  - 150
  - 151
  - 166
38. Distance between two stations, X and Y is 778 km. A train covers the journey from X to Y at 84 Km per hour and returns back to X with a uniform speed of 56 Km per hour. Find the average speed of the train during the whole journey?
- 67.0 Km/hr.
  - 67.2 Km/hr.
  - 69.0 Km/hr.
  - 69.2 Km/hr.
39. The sum of three numbers is 98. If the ratio of the first to second is 2:3 and that of the second to the third is 5:8, then the second number is?
- |       |       |
|-------|-------|
| A. 20 | B. 30 |
| C. 48 | D. 58 |
40. When you reverse the age of the father you will get the age of the son. One year ago the age of the father was twice that of son's age. What are the current ages of son and father?
- |              |              |
|--------------|--------------|
| A. 37 and 73 | B. 24 and 42 |
| C. 13 and 31 | D. 15 and 51 |
41. The number of repeating units in a polymer is known as:
- monomer
  - degree of polymerization
  - molecule
  - chain
42. Which polymer additives are added to improve flexibility?
- Lubricants
  - Plasticizers
  - Stabilizers
  - Reinforcements
43. In birds, the body temperature is about 112°F and the regulation of body temperature is maintained constant by the:
- Skin
  - Kidney
  - Air sacs
  - Sweating

44. Biotic index gives us an idea about the pollution of:
- Water
  - Air
  - Sound
  - All the above
45. Which of the following is a metallic biomaterial:
- Titania
  - Zirconia
  - Nitinol
  - Hydroxyapatite
46. Which of the following molecule is Raman active but IR inactive:
- Carbon dioxide
  - Nitrogen
  - Water
  - Ozone
47. The instrumental analysis suitable for trace level elemental analysis is:
- UV-Visible spectroscopy
  - Raman spectroscopy
  - X-Ray diffraction analysis
  - Inductively coupled-Optical emission spectroscopy
48. NMR inactive isotope is:
- ${}^1_1\text{H}^1$
  - ${}^{12}_6\text{C}^{12}$
  - ${}^{13}_6\text{C}^{13}$
  - ${}^{17}_8\text{O}^{17}$
49. The correct statement regarding pH of pure water is:
- always 7
  - greater than 7
  - below 7
  - depend on the temperature
50. Milk is a/an:
- sol
  - gel
  - Water-in-oil emulsion
  - Oil-in-water emulsion
51. Optically active compound amongst the following is:
- Isobutanol
  - Secondary butanol
  - n-butanol
  - Isopropanol
52. Temperature independent concentration unit is:
- Molality
  - Molarity
  - Normality
  - Formality

53. The condition for spontaneity is:
- $\Delta G > 0$
  - $\Delta G < 0$
  - $\Delta G = 0$
  - $\Delta H < 0$
54. Aqueous solution with highest osmotic pressure is (assume all electrolytes are completely ionized):
- 0.1 molal Aluminium sulfate
  - 0.3 molal glucose
  - 0.3 molal sodium chloride
  - 0.2 molal Hydrochloric acid
55. Which of the following is not a natural polymer?
- Keratin
  - Collagen
  - Polyisoprene
  - Nylon
56. Enzymes necessary for beta oxidation of fatty acids are present in:
- Mitochondria & Golgi
  - Mitochondria & Peroxisome
  - Mitochondria
  - Mitochondria & Cytoplasm
57. Loss of function of the enzyme  $\beta$ -hexosaminidase A causes the lysosomal storage disorder called:
- Tay-Sach's syndrome
  - Fabry disease
  - Niemann-Pick disease
  - Gauche's disease
58. Which vitamin deficiency results in Biot's spot?
- Vitamin D
  - Vitamin A
  - Vitamin C
  - Vitamin E
59. Why do electron microscopes have better resolution than light microscopes?
- Wavelength of electron is shorter than wavelength of light
  - Wavelength of electron is longer than wavelength of light
  - Electrons penetrate the sample efficiently
  - Both microscopes use different stains
60. Which of the following stimulates protein kinase A?
- Oxytocin
  - Vasopressin
  - Gonadotropin releasing hormone
  - Insulin
61. Sulbactam is a:
- $\beta$ -lactamase inhibitor
  - $\beta$ -lactam antibiotic
  - a class of penicillin
  - $\beta$ -lactamase

62. Which of the following is a sugar alcohol?
- Mannitol
  - Xylitol
  - Isomalt
  - all of the above
63. Which amino acid is the precursor for neurotransmitter serotonin synthesis?
- L-tryptophan
  - Tyrosine
  - Glycine
  - Arginine
64. A fertilized egg is called?
- Blastula
  - Oocyte
  - Embryo
  - Zygote
65. Cells that produce mucus within the stomach to protect its lining are called?
- Chief Cells
  - Foveolar Cells
  - Goblet Cells
  - Microvilli
66. Following is the unique to polymeric materials:
- Elasticity
  - Viscoelasticity
  - Plasticity
  - None
67. Elastic deformation in polymers is due to:
- Slight adjust of molecular chains
  - Slippage of molecular chains
  - Straightening of molecular chains
  - Severe of Covalent bonds
68. It is not a characteristic property of ceramic material:
- high temperature stability
  - high mechanical strength
  - low elongation
  - low hardness
69. Which one of the following is not a basic component of Materials Science?
- |              |                |
|--------------|----------------|
| A. Cost      | B. Properties  |
| C. Structure | D. Performance |
70. What is the pH of a solution that is 1000 times more acidic than pure water?
- |      |      |
|------|------|
| A. 4 | B. 3 |
| C. 2 | D. 1 |
71. What is the temperature above which a gas cannot be converted to a liquid?
- Critical temperature
  - Boyle's temperature
  - Critical micelle concentration
  - Glass transition temperature



72. Which of the following refers to the scattering of light by colloidal particles?
- Rutherford effect
  - Tyndall effect
  - Thompson effect
  - none of these
73. A compound which contains two ring structures having one common carbon atom is known as a
- spiro-compound
  - nonpolar compound
  - interstitial compound
  - inner compound
74. Which of the following techniques would be most useful to identify and quantify the presence of a known impurity in a drug substance?
- NMR
  - HPLC
  - IR
  - MS
75. The dichromate ion absorbs light of wavelength close to 500 nm. Based on this information, what can you conclude?
- The dichromate ion absorbs within the visible region
  - The dichromate ion absorbs in the ultraviolet region
  - The dichromate ion absorbs outside the visible region
  - Solutions of the dichromate ion are colourless
76. The Williamson ether synthesis produces ethers by reacting an:
- alcohol with a metal
  - alkoxide with a metal
  - alkoxide with an alkyl halide
  - alkyl halide with an aldehyde
77. The process in which no heat enters or leaves the system is termed as
- Isochoric
  - Isobaric
  - Isothermal
  - Adiabatic
78. Which of these does not influence the rate of reaction?
- Nature of the reactants
  - Concentration of the reactants
  - Temperature of the reaction
  - Molecularity of the reaction
79. An electrochemical cell is also called:
- battery cell
  - Galvanic cell
  - Leclanche cell
  - chargeable cell
80. What is the minimum number of hydrogen bonds that operate between base pairs in DNA?
- |      |      |
|------|------|
| A. 1 | B. 2 |
| C. 3 | D. 4 |

81. Which of the following solvents is non-polar?
- A. Acetonitrile
  - B. Cyclohexane
  - C. Dichloromethane
  - D. Acetone
82. Isotopes of hydrogen differ in
- A. the number of electrons they possess
  - B. the number of protons they possess
  - C. the number of neutrons they possess
  - D. their atomic number
83. When a radioactive substance is subjected to vacuum, the rate of disintegration per second
- A. Increases only if the products are gaseous
  - B. Increases considerably
  - C. Decreases
  - D. Not affected
84. Which one of the following statement is incorrect about enzyme catalysis?
- A. Enzymes are denatured by ultraviolet rays and at high temperature
  - B. Enzymes are least reactive at optimum temperature
  - C. Enzymes are mostly proteinous in nature
  - D. Enzyme action is specific
85. Which one of the following does not involve coagulation?
- A. Peptization
  - B. Formation of delta regions
  - C. Treatment of drinking water by potash alum
  - D. Clotting of blood by the use of ferric chloride
86. The gene therapy was first tried for which disease?
- A. HIV
  - B. SCID
  - C. Cystic fibrosis
  - D. Hemophilia
87. Which of the following is a procoagulant lipid?
- A. Phosphatidyl serine
  - B. Phosphatidyl choline
  - C. Phosphatidyl ethanolamine
  - D. Phosphatidylinositol
88. Which of the following is the origin of the majority of the ATP used in the pathway of gluconeogenesis?
- A.  $\beta$ -oxidation of fatty acids
  - B. degradation of glycogen
  - C. breakdown of amino acids
  - D. fructose 2,6-bisphosphate
89. In contrast to chemical induced mutations, mutations induced by transposons are more likely to:
- A. be lethal
  - B. be stable
  - C. be dominant
  - D. revert to wild type

90. An example of aprotic solvent
- A. Water
  - B. Acetone
  - C. Dichloromethane
  - D. Hexamethylphosphotriamide
91. Polymer that undergoes a sharp thermally induced phase separation:
- A. Polyacrylic acid
  - B. Polyacrylamide
  - C. Poly N-Isopropylacrylamide
  - D. Polymethacrylic acid
92. Which of the following is a natural non-fouling surface composition?
- A. Ornithine
  - B. Chitosan
  - C. Phospholipid bilayer
  - D. Poly-Lysine
93. The intrinsic pathway of blood coagulation is initiated when ----- is activated
- A. Factor XII
  - B. Factor X
  - C. Factor IX
  - D. Factor II
94. The release of intra platelet \_\_\_\_\_ promotes secondary platelet aggregation and creation of adherent thrombus
- A. AMP
  - B. ATP
  - C. ADP
  - D. none of the above
95. Lectins having only one carbohydrate recognizing domain is called:
- A. Chimerlectins
  - B. Merolectins
  - C. Hololectins
  - D. none of the above
96. The chemical used for inducing diabetes:
- A. Adriamycin
  - B. Paclitaxel
  - C. Curcumin
  - D. Streptozotocin
97. Substrate phosphorylation is catalyzed by which of the following enzymes?
- A. Hexokinase
  - B. Pyruvate kinase
  - C. Galactokinase
  - D. All the above
98. In glycoproteins, the carbohydrate moiety always get attached through which of the following amino acids?
- A. Glycine, alanine, leucine
  - B. Aspartate, glutamate
  - C. Glutamine, arginine
  - D. Asparagine, serine, threonine

99. Which of the following polymer is not suitable for complexing with DNA?

- A. Polyethylene imine
- B. Poly L-Lysine
- C. Polyarginine
- D. Polyacrylates

100. A radioactive isotope, which is used in diagnostic imaging, has a half-life of 6 hours. If a quantity of this isotope has an activity of  $150\mu\text{Ci}$  when it is delivered to the hospital, how much activity will remain 24 hours after delivery?

- A.  $4.7\mu\text{Ci}$
- B.  $19\mu\text{Ci}$
- C.  $9.4\mu\text{Ci}$
- D.  $38\mu\text{Ci}$

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