

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकीसंस्थान, तिरुवनंतपुरम्-11  
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY  
THIRUVANANTHAPURAM—695 011

PHD ENTRANCE EXAMINATION - ACADEMIC SESSION JANUARY 2019

PROGRAMME: CHEMICAL SCIENCES

Time: 90 Minutes

Max. Marks: 100

(Select the most appropriate answer)

(There are **no negative** marks for wrong answers)

- Ranjan Gogoi is serving as the \_\_\_\_\_ Chief Justice of India.  
a. 46<sup>th</sup>      b. 48<sup>th</sup>      c. 42<sup>nd</sup>      d. 44<sup>th</sup>
- Nadia Murad won the Nobel prize for:  
a. Physics  
b. Chemistry  
c. Peace  
d. Medicine
- S-400 'Triumf' is the name of:  
a. Missile system.  
b. Satellite system  
c. Bomber system  
d. Ecosystem
- MiG-21 is:  
a. Fighter jet  
b. War ship  
c. Submarine  
d. Rescue boat
- Find the correctly spelt word:  
a. Surveilance  
b. Surveillance  
c. Survellance  
d. Survaillance
- Which among the following is responsible for the health hazards associated with paints/varnish?  
a. Formaldehyde      b. Lead      c. Cadmium      d. Chromium

7. Single disease control programs are also called
  - a. Horizontal health programs
  - b. Integrated health programs
  - c. Interventional programs
  - d. Vertical health programs
  
8. A vitamin which is soluble in water:
  - a. Vitamin C
  - b. Niacin
  - c. Riboflavin
  - d. All the above
  
9. Tides are primarily caused by:
  - a. Attraction of the moon
  - b. Farrel's law
  - c. Earth's pressure system
  - d. Ocean Currents
  
10. Primary source of nutrients for plants is:
  - a. Sun light
  - b. Soil
  - c. Chlorophyll
  - d. Pesticides
  
11. Chemical, ionizing agent or virus that can cause birth defects
  - a. Teratogenic
  - b. Mutagenic
  - c. Carcinogenic
  - d. Embryogenic
  
12. Entomology is the scientific study of:
  - a. Insects
  - b. Formation of rocks
  - c. Scientific names
  - d. Behaviour of human beings
  
13. The acronym NFHS used in the surveys for information on maternal and child health in India stand for:
  - a. National Fertility and Health Survey
  - b. National Family and Household Study
  - c. National Family Health Survey
  - d. National Farm and Household Survey

14. The Hathi commission report (1975) was on:

- a. Pharmaceutical industry in India
- b. Hospitals in India
- c. Doctors in India
- d. Nursing in India

15. A disease that spread by contact:

- a. Infectious
- b. Fatal
- c. Contagious
- d. Incurable

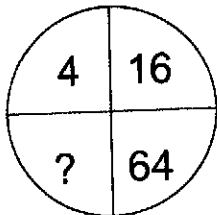
16. The ICDS scheme includes the following components, except

- a. Supplementary nutrition for mothers and children
- b. Growth monitoring
- c. Ante-natal clinics
- d. Immunization

17. Gradual changes in the frequency of a disease over a long time period is referred to as:

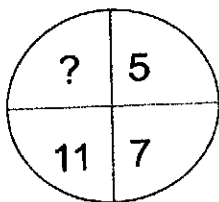
- a. Secular time trends
- b. Cyclic fluctuations
- c. Latency period
- d. Temporal clustering.

18. Find the missing number in the figure below:



- a. 16
- b. 52
- c. 112
- d. 256

19. Find out the missing number in the figure below



- a. 1
- b. 9
- c. 12
- d. 17

20. Find the odd man out:

- a. Parrot                      b. Vulture                      c. Swan                      d. Sparrow

21. Arrange the following words in the order they appear in the dictionary:

1. Scenery 2. Science 3. Scandal 4. School 5. Scatter.

- a. 3,5,1,4,2;  
b. 3,5,4,1,2;  
c. 5,3,4,2,1;  
d. 5,3,2,1,4

22. Complete the following sentences (questions 22-24) by choosing the correct passive forms of the verbs given:

The thief \_\_\_\_\_ yesterday and was prisoned

- a. is caught  
b. is being caught  
c. was caught  
d. has been caught

23. A couple of warnings \_\_\_\_\_ before the storm

- a. will have been issued  
b. have been issued  
c. had been issued  
d. has been issued

24. We know that poems \_\_\_\_\_ these days by you

- a. are being composed  
b. is being composed  
c. have been composed  
d. were being composed

25. Find the word which cannot be formed from the letters of the word, 'REPUBLICAN'.

- a. CLIP                      b. PURE                      c. ANKLE                      d. BANE

26. Find the word which cannot be formed from the letters of the word,

'RECOMMENDATION'.

- a. NATION  
b. COMMENT  
c. COMMON  
d. RECOMMENDS

27. If the first day of the year (other than the leap year) was Friday, then which was the last of that year?
- Wednesday
  - Thursday
  - Friday
  - Sunday
28. If every second Saturday and all Sundays are holidays in a 30 days month beginning on Saturday, then how many working days are there in that month?
- 15
  - 18
  - 23
  - 25
29. The programming language Java was originally developed by:
- Oracle
  - Microsoft
  - Novell
  - Sun Microsystems
30. One Terabyte (1 TB) is equal to:
- 1028GB
  - 1012GB
  - 1000GB
  - 10<sup>24</sup> GB
31. Which operating system is developed and used by Apple Inc?
- Windows
  - Android
  - iOS
  - UNIX
32. Pick the odd one out in the following numbers: 13, 23, 33, 43, 53 ?
- 23
  - 33
  - 43
  - 53
33. It was calculated that 75 men could complete a piece of work in 20 days. When work was scheduled to commence, it was found necessary to send 25 men to another project. How much longer will it take to complete the work?
- 25 days
  - 30 days
  - 35 days
  - 40 days
34. What percentage of numbers from 1 to 70 has 1 or 9 in the unit's digit?
- 1
  - 14
  - 20
  - 21
35. REASON : SFBTPO :: THINK : ?
- SGHMJ
  - UIJOL
  - UHNKI
  - UJKPM
36. 'Captain' is related to 'Soldier' in the same way as 'Leader' is related to:
- Chair
  - Followers
  - Party
  - Minister

37. M has a son Q and a daughter R. He has no other children. E is the mother of P and daughter-in law of M. How is P related to M?
- P is the son-in-law of M
  - P is the grandchild of M
  - P is the daughter-in law of M
  - P is the grandfather of M
38. The number that least fits this set: (324, 441, 97 and 64) is \_\_\_\_\_.
- 324
  - 441
  - 97
  - 64
39. It takes 10 s and 15 s, respectively, for two trains travelling at different constant speeds to completely pass a telegraph post. The length of the first train is 120 m and that of the second train is 150 m. The magnitude of the difference in the speeds of the two trains (in m/s) is:
- 2.0
  - 10.0
  - 12.0
  - 22.0
40. The sum of two numbers is 25 and their difference is 13. Find their product.
- 104
  - 114
  - 315
  - 325
41. The nitrogen atom has 7 protons and 7 electrons, The number of electrons in nitride and azide ions will be ...
- 7 and 21,
  - 10 and 22,
  - 8 and 22
  - 4 and 20
42. An atom has 5 electrons in its M - shell and contains 16 neutrons in its nucleus. What is its mass number?
- 31,
  - 33,
  - 25,
  - 30
43. Electromagnetic radiation with maximum wavelength is.....
- Gamma rays,
  - beta rays,
  - X rays,
  - Radio waves
44. An element which is preserved under water is .....
- Magnesium,
  - Sodium,
  - Cesium,
  - White Phosphorus
45. Molisch's reagent is used for the detection of .....
- Nucleic acids,
  - Lipids,
  - Carbohydrates,
  - Proteins
46. Purple of Cassius is the colloidal solution of .....
- Au,
  - Ag,
  - Ni,
  - Pt
47. What is known as the energy currency of human body?
- Mitochondria,
  - Lysosome,
  - ATP,
  - Glucose
48. Water gas consists of .....
- Water and LPG,
  - Water and H<sub>2</sub>,
  - CO and H<sub>2</sub>,
  - CO and H<sub>2</sub>O<sub>2</sub>

49. What chemical element gives the blood of sea animals like lobster and octopus a bluish tint?  
 a. Haemocyanin,  
 b. Carboxyhaemoglobin,  
 c. Haemerythrin,  
 d. Haemochlorin
50. Which one is the densest material in the universe?  
 a. Ir,                    b. Rh,                    c. Diamond,                    d. Neutron star
51. Hyponatremia is...  
 a. Low level of Nitrogen in the blood,  
 b. High level of Nitrogen in the blood,  
 c. Low level of sodium in the blood,  
 d. High level of ammonia in the blood
52. If you fill a glass to the brim with ice water and the ice melts, what will happen?  
 a. The glass will over flow,  
 b. The level of water in the glass will remain unchanged,  
 c. The water level will drop slightly,  
 d. Neither of these
53. Stibnum is the old name of the element:  
 a. Bismuth,                    b. Antimony,                    c. Sodium,                    d. Selenium
54. Which is the most abundant protein in the human body?  
 a. Keratin,                    b. Chitin,                    c. Collagen,                    d. Thrombin
55. A topography formed by the dissolution of soluble rocks like gypsum, dolomite, etc. is called.....  
 a. Estuary,                    b. Stalagmites,                    c. Karst,                    d. Stalagmites
56. Among the 5 amino acids listed below, which are required for the synthesis of creatinine?  
 i) Glycine,    ii) Alanine,    iii) Arginine,    iv) Methionine &    v) Histidine  
 a. All of these,                    b. i, iii and iv,                    c. i alone,                    d. v alone
57. Phosgene contains ...% enriched phosphorus  
 a. 15 %,                    b. 21%,                    c. 0 %,                    d. 90%
58. Hydrogen gas is .....in color  
 a. Blue,                    b. Black,                    c. Colorless,                    d. White
59. A colloidal solution of solid in liquid is called .....  
 a. Sol,                    b. Emulsion,                    c. Suspension,                    d. Gel
60. The maximum number of electrons a principal shell can accommodate is.....  
 a.  $n^2$ ,                    b.  $2n^2$ ,                    c.  $2n$ ,                    d.  $n+2$

61. Urea is capable to effect denaturing of proteins because:

- a. It is organic,
- b. It disrupts water,
- c. It affects hydrogen bonding,
- d. It produces CO.

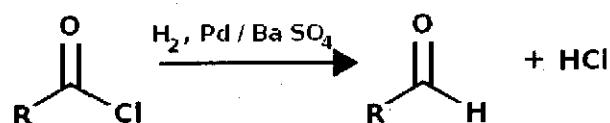
62. What is the order of bond order of the following species:  $O_2$ ,  $O_2^-$ ,  $O_2^+$  ?

- a.  $O_2^- < O_2 < O_2^+$ ,
- b.  $O_2 < O_2^- < O_2^+$ ,
- c.  $O_2^+ < O_2^- < O_2$ ,
- d.  $O_2^+ = O_2^- < O_2$

63. What is the STYX number of Diborane?

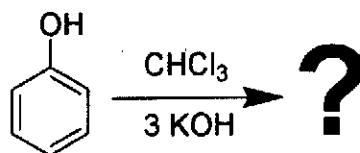
- a. 3001,
- b. 2020,
- c. 2002,
- d. 4001

64. Identify the reaction:



- a. Clemenson's reduction,
- b. MPV reduction,
- c. Rosenmund reduction,
- d. Wulf-Kischner reduction

65. Predict the product of the reaction:



- a. Benzene,
- b. Benzaldehyde,
- c. Salicylaldehyde,
- d. Gluteraldehyde

66. Cope rearrangement involves:

- a. [1,5]-sigmatropic rearrangement,
- b. [4+2]-cycloaddition reaction,
- c. [3,3]-sigmatropic rearrangement,
- d. [2+2]-cycloaddition reaction

67. Who was known as modern Isaac Newton for his path breaking inventions in the field of LCDs?

- a. Pierre Curie,
- b. Pierre de Gennes,
- c. Robert Pierre,
- d. Pierre Walsch

68. What is the point group of Fullerene  $C_{60}$ ?

- a.  $D_{6h}$ ,
- b.  $I_h$ ,
- c.  $T_d$ ,
- d.  $O_h$

69. SDS-PAGE is an important technique used for the analysis of bio-macromolecules. It separate the components based on.....

- a. 3D Structure,
- b. Charge,
- c. Size,
- d. pH



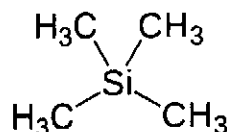
70. The materials which change their color in response to the pH of the system are commonly known as.....

- a. Photochromic,      b. Halochromic,      c. Solvchromic,      d. Hydrochromic

71. A compound X has a distribution constant  $K_d=0.8$ . When introduced into a system containing an organic solvent and water, X will be partitioned to .....

- a. Organic phase,  
b. Aqueous phase,  
c. Stay at the interface,  
d. It will float

72. The compound whose structure shown below will give  $^1\text{H NMR}$  signal at a  $\delta$  value of.....



- a. 1.2 ppm,      b. 2.3 ppm,      c. 0 ppm,      d. 0.9 ppm

73. Doxorubicin and Epirubicin,  $\alpha$ -D-glucopyranose and  $\beta$ -D-glucopyranose,  $\beta$ -D-glucopyranose and  $\beta$ -D-mannopyranose. These groups of compounds are called:

- a. Ionomers,      b. Epimers,      c. Stratomers,      d. Polymers

74. Element Y emits successively 2  $\beta$ -particles, 1  $\alpha$ -particle, 2 neutrons and a positron. Atomic number and mass number of the element will be decreased by.....

- a. 2 and 5,      b. 1 and 6,      c. 1 and 4,      d. 2 and 6

75. Name the product of the following reaction scheme?



- a. Cyclohexane      b. Benzene,      c. Cyclopentane,      d. Cyclohexanol

76. A polymer has a number average molecular weight of 56 kDa what will be its Weight average molecular weight if the polydispersity index is 1.3?

- a. 43.08 kDa,      b. 60 kDa,      c. 75.4 kDa,      d. 72.8 kDa

77. BCS (Bardeen-Cooper-Schrieffer) theory is related to.....

- a. Liquid crystals,  
b. Superconductivity,  
c. Medical devices,  
d. Supercapacitors

78. Lithopone is a white pigment powder commonly used in paints. It consists of.....

- a. ZnO and  $\text{TiO}_2$ ,  
b. ZnS and  $\text{TiO}_2$ ,  
c. ZnO and  $\text{BaSO}_4$ ,  
d. ZnS and  $\text{BaSO}_4$

79. Natural rubber is chemically.....
- trans-poly(1,3-butadiene),
  - cis- poly(1,3-butadiene),
  - trans-poly( 2-methyl-1,3-butadiene),
  - cis-poly(2-methyl-1,3-butadiene)
80. Which of the following is not an essential constituent for the preparation of BUNA-N?
- 1,3-Butadiene,
  - Sodium,
  - Nitrogen,
  - Acrylonitrile
81. Common preservative used for natural rubber latex is.....
- Urea,
  - Formalin,
  - Ammonia,
  - Acetone
82. Neoprene is a polymer of .....
- Isoprene,
  - Chloroprene,
  - Iodoprene,
  - Norbornene
83. EPDM is a.....
- Natural rubber,
  - Homopolymer,
  - Terpolymer,
  - Thermoset
84. Shore A Durometer is used to measure the.....of the polymeric materials.
- Hardness,
  - Thickness,
  - Brightness,
  - Fineness
85. Technique used for the manufacturing of Polyethylene terephthalate (PET) bottles is.....
- Injection moulding,
  - Blow moulding,
  - Injection stretch moulding,
  - Transfer moulding
86. Polymers which are soluble in water due to hydrogen bonding often possess.....
- Upper Critical Solution Temperature,
  - Lower Critical Solution Temperature,
  - No Critical Solution Temperature,
  - High boiling point
87. The random movement of particles dispersed in a liquid phase was first discovered by:
- R Hooke,
  - R Brown,
  - R Koch,
  - R Frost
88. Which of the following is obtained by ring opening polymerisation?
- Nylon 6,
  - Poly(Caprolactum),
  - Poly(6-aminocaproic acid),
  - All the above
89. Super critical carbon dioxide has a critical temperature of .....
- 35 °C,
  - 45 °C,
  - 35 °C,
  - 31 °C

90. Aqueous solutions of ..... complexed with iodine is used for wound care applications under the name Betadine.

- a. Poly(N-vinylcarbazole),
- b. Poly(N-vinylpyrrolidone),
- c. Poly(N-vinylloxazole),
- d. Poly(N-vinylpyrazole)

91. Sylvite is chemically.....

- a. AgCl,
- b. KCl,
- c. NaCl,
- d. CsCl

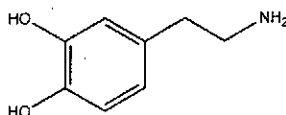
92. Peroxide ions are isoelectronic with.....

- a.  $\text{Na}^+$ ,
- b.  $\text{F}_2$ ,
- c. Cl,
- d.  $\text{CO}_2$

93.  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$  is known as.....

- a. Glauber's salt,
- b. Pelligot salt,
- c. Marshal salt,
- d. Thorou's salt

94. Identify this compound:

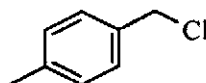


- a. Dopamine,
- b. Adrenaline,
- c. Epinephrine,
- d. Serotonin

95. Which of the following is a super acid?

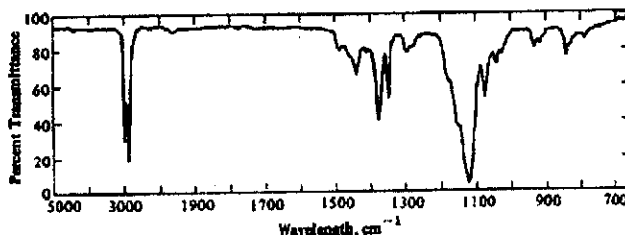
- a.  $\text{HNO}_3$ ,
- b.  $\text{H}_2\text{SO}_4$ ,
- c.  $\text{HF-SbF}_5$ ,
- d.  $\text{HNO}_3 + \text{HCl}$

96. How many peaks will be there in the  $^1\text{H}$ NMR spectrum of this compound?



- a. 3 peaks,
- b. 5 peaks,
- c. 4 peaks,
- d. 6 peaks

97. FTIR spectrum of a compound is given below. It could be .....



- a. Alcohol,
- b. Amine,
- c. Ether,
- d. Ketone

98. Which of the following bond will vibrate at higher wavenumbers ?

- a. C-H,
- b. C-D,
- c. C-C,
- d. C-O

99. Multiplets of peaks observed around  $3000\text{ cm}^{-1}$  in the FT-IR spectrum of an organic compound is corresponding to the vibrations of .....

- a. C=C,
- b. C-H,
- c. O-H,
- d. N-H

100. What is the unit of Debye (D)?

- a. C.m,
- b.  $\text{A cm}^2$ ,
- c. Ohms,
- d. C/s

