



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

STREAM: Bioengineering

Time: 90 Minutes

Max. Marks: 100

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

1. Ranjan Gogoi is serving as the _____ Chief Justice of India.
a. 46th b. 48th c. 42nd d. 44th
2. Nadia Murad won the Nobel prize for:
a. Physics
b. Chemistry
c. Peace
d. Medicine
3. S-400 'Triumf' is the name of:
a. Missile system.
b. Satellite system
c. Bomber system
d. Ecosystem
4. MiG-21 is:
a. Fighter jet
b. War ship
c. Submarine
d. Rescue boat
5. Find the correctly spelt word:
a. Surveillance
b. Surveilance
c. Survellance
d. Survaillance
6. 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
- Horizontal health programs
 - Integrated health programs
 - Interventional programs
 - Vertical health programs
8. A vitamin which is soluble in water:
- Vitamin C
 - Niacin
 - Riboflavin
 - All the above
9. Tides are primarily caused by:
- Attraction of the moon
 - Farrel's law
 - Earth's pressure system
 - Ocean Currents
10. Primary source of nutrients for plants is:
- Sun light
 - Soil
 - Chlorophyll
 - Pesticides
11. Chemical, ionizing agent or virus that can cause birth defects
- Teratogenic
 - Mutagenic
 - Carcinogenic
 - Embryogenic
12. Entomology is the scientific study of:
- Insects
 - Formation of rocks
 - Scientific names
 - Behaviour of human beings
13. The acronym NFHS used in the surveys for information on maternal and child health in India stand for:
- National Fertility and Health Survey
 - National Family and Household Study
 - National Family Health Survey
 - 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

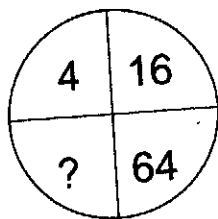
16. The ICDS scheme includes the following components, except

- 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:

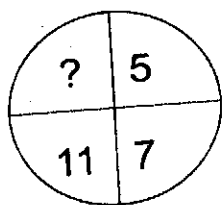
- a. Secular time trends
- b. Cyclic fluctuations
- c. Latency period
- d. Temporal clustering.

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
 - 1024 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 type of stethoscope commonly used by most doctors is:
- Acoustic stethoscope
 - Electronic stethoscope
 - Recording stethoscope
 - Doppler stethoscope
42. The widening of blood vessels is known as:
- Vasoconstriction
 - Atherosclerosis
 - Vasodilation
 - Thrombosis
43. Normal human body temperature in degrees Celsius is:
- 37 ± 0.5
 - 38.5 ± 0.5
 - 35.6 ± 0.5
 - 39 ± 0.5
44. What is the medical technology that measures brain activity by detecting associated changes in blood flow?
- Functional nuclear magnetic resonance
 - Structural nuclear magnetic resonance
 - Computerized axial tomography
 - Ultrasound scan

45. Electrooculography (EOG/E.O.G.) is a technique for measuring:
- Abnormal function of the retina
 - Heart rate
 - Respiration rate
 - Cornea-retinal standing potential
46. Phonocardiography is the recording of the:
- Sound of arm muscles
 - Sound of lungs
 - Sounds made by the heart
 - Respiratory tract sound
47. Which of the following should be as high as possible for a measuring instrument?
- Signal to noise ratio
 - Hysteresis
 - Range
 - Frequency response
48. The Galvanic Skin Response (GSR) measurement is used to know the:
- Cardiac activity of heart
 - Functional activity of heart
 - Dermal activity of sweat gland
 - None of these
49. The degree to which variations in the output of an instrument follow input variations is referred to as:
- Sensitivity
 - Linearity
 - Hysteresis
 - Accuracy
50. Which of the following is not a passive transducer?
- Strain gauge
 - Ultrasonic transducer
 - IR sensor
 - Doppler Effect transducer
51. Degree of repeatability of a measurement is described by:
- Accuracy
 - Precision
 - Sensitivity
 - Resolution
52. Linearity of a transducer is the:
- Closeness of transducer's calibration curve to a special curved line within a given percentage of full scale output
 - Closeness of transducer's calibration curve to a special curved within a given percentage of half scale output
 - Closeness of transducer's calibration curve to a special straight line within a given percentage of half scale output
 - Closeness of transducer's calibration curve to a special straight line within a given percentage of full scale output
53. Cells of the immune system that are involved in protecting the body against both infectious disease and foreign invaders:
- Eosinophils
 - Erythrocytes
 - Leukocytes
 - All of the above

54. According to the international 10/20 system to measure EEG, even number denotes which side of the brain?
- a. Left
 - b. Right
 - c. Bottom
 - d. Top
55. Devices that pass the signal from its source to the measurement device without a physical or galvanic connection by using transformer, optical or capacitive coupling technique are called?
- a. Isolators
 - b. Rectifiers
 - c. Bridges
 - d. Filters
56. To achieve the low frequency response for medical applications, the amplifier configuration must contain?
- a. Higher resistance
 - b. Lower resistance
 - c. Higher capacitance
 - d. Lower capacitance
57. Ag-AgCl electrodes are:
- a. Partially polarized
 - b. Practically polarized
 - c. Polarized
 - d. Non-polarized
58. Instrumentation Amplifier is an extension of:
- a. Inverting Amplifier
 - b. Non-inverting Amplifier
 - c. Difference Amplifier
 - d. Summing Amplifier
59. Which of the following is an essential component of communication cycle?
- a. An interpreter
 - b. An internet connection
 - c. An email account
 - d. A message
60. The use of the microcomputers as a decision tool:
- a. Allows the microcomputer to support human decisions
 - b. Can make common decisions according to rules
 - c. Makes all decisions for human action
 - d. Is not possible at the present state of computer technology
61. The exact analysis of viscous flow problems can be made by:
- a. Eulers equation
 - b. Hagen Poiseuille's equation
 - c. Bernoulli's equation
 - d. Navier Stokes equation
62. Steady flow occurs when:
- a. Pressure does not change with flow
 - b. Velocity does not change
 - c. Conditions change gradually with time
 - d. Conditions do not change with time at any point

63. For a fully developed flow through a pipe, the ratio of the maximum velocity to the average velocity is:
 a. 1 b. 2 c. $\sqrt{2}$ d. 4
64. Bernoulli's theorem deals with conservation of:
 a. Mass b. Force c. Momentum d. Energy
65. The stress strain relation of the Newtonian fluid is:
 a. Linear b. Inverse type c. Parabolic d. Hyperbolic
66. Which tree gives out the latex to obtain natural rubber?
 a. Eucalyptus
 b. Hevea brasiliensis
 c. Anogeissus
 d. Astragalus
67. Chemical name of natural rubber is:
 a. cis 1,4-polyisoprene
 b. trans 1,4-polyisoprene
 c. cis 1,3-polyisoprene
 d. trans 1,3-polyisoprene
68. What is the melting point of polytetrafluoroethylene?
 a. 100 °C b. 156 °C c. 327 °C d. 533 °C
69. Which of the following fluoropolymer film is sold under the trade name Tedlar® by DuPont?
 a. Polytetrafluoroethylene
 b. Polyvinyl fluoride
 c. Polyvinylidene fluoride
 d. Hexafluoropropylene
70. What is the approximate density of polytetrafluoroethylene?
 a. 1.8 g/cm³ b. 2.2 g/cm³ c. 0.6 g/cm³ d. 1.5 g/cm³
71. Class of the additives that prevent the degradation of polymers during their processing and storage?
 a. Stabilizers b. Plasticizers c. Fillers d. Cross-linking agents
72. What is the use of carbon black in polymer compounding as an additive?
 a. As a filler b. As a colorant
 c. As a stabilizer d. All of the above
73. Which of the following additive can act as curing agent for epoxides?
 a. Amines b. Formaldehyde c. Sulphur d. All of the above
74. Addition of antimony oxychloride into a polymer improves its:
 a. Flame retardancy
 b. Toughness
 c. Buildup of static electricity
 d. Color

75. Which of the following compounds are used as antistatic agent?
a. Sulphur compounds
b. Ammonium compounds
c. Chlorinated compounds
d. None of these
76. Which of the following is used as a chemical blowing agent in polymers?
a. Trixylyl phosphate
b. Azonitriles
c. Antimony oxide
d. None of these
77. What is the approx. percentage of chlorine present in Polyvinyl chloride?
a. 57% b. 51% c. 47% d. 42%
78. A solvent that cannot dissolve Polyvinyl chloride:
a. Cyclohexanone
b. Tetrahydrofuran
c. Hexane
d. Nitrobenzene
79. The class of compounds that impart flexibility to Polyvinyl Chloride products?
a. Stabilizers b. Lubricants c. Plasticizers d. Coloring agents
80. Which of the following compound is used as flame retardant in compounds of PVC?
a. Dibutyl sebacate
b. Dioctyl phthalate
c. Barium sulfate
d. Tricresyl phosphate
81. Which of the following monomer pairs form a copolymer that exhibits excellent chemical resistance and self-extinguishing properties?
a. Vinyl chloride + Vinylidene chloride
b. Vinyl chloride + Vinyl acetate
c. Vinyl chloride + Acrylonitrile
d. None of these
82. The commonly used Magnetic Resonance Imaging (MRI) machines have a magnetic strength of:
a. 1.5 - 3 Tesla b. 3 - 6 Tesla c. 6 - 12 Tesla d. 12 - 24 Tesla
83. The cooling agent for the MRI magnet is:
a. Helium b. Neon c. Argon d. Xenon
84. Computerized Axial Tomography scan is essentially:
a. A finer X - ray of bones
b. An ultrasound image of organs
c. X - ray of soft tissues
d. X - ray of brain

85. Why is contrast used in CT scan?
- To suppress the image of particular tissues
 - To enhance the image of particular tissues
 - To ensure correct tissue is being imaged
 - To reduce bone interference
86. In order to visualize the flow of blood in the renal arteries, what process is done with CT?
- CT Angioplasty
 - CT Angiography
 - Simple CT
 - CT Cardiography
87. The radiodensity or the radiopacity is measured in:
- mA
 - mV
 - g/m^3
 - Hounsfield units
88. Which of the following statement is false about DNA?
- Located in chromosomes
 - Carries genetic information from parent to offspring
 - Abundantly found in cytoplasm
 - There is a precise correlation between amount of DNA and number of sets of chromosome per cell
89. Fredrick Griffith's experiment involving *Streptococcus pneumoniae* lead to the discovery of:
- DNA as genetic material
 - RNA as genetic material
 - Protein as genetic material
 - Transforming principle
90. According to Mendel's experiments gene carry genetic information from parents to offspring. On which plant did he perform his experiments?
- Oryza sativa*
 - Pisum sativum*
 - Allium cepa*
 - Vitis vinifera*
91. Plasmids are:
- Double stranded DNA
 - Circular double stranded DNA
 - Linear double stranded DNA
 - Supercoiled circular double stranded DNA
92. The principle driving force for adenylation reaction during the formation of the aminoacyl tRNA is carried out by:
- Isomerase
 - Synthetase
 - Pyrophosphatase
 - Phosphokinase
93. How many tRNA synthetases are found in a cell?
- 64
 - 32
 - 10
 - 20

94. Which of the following pair is an example for using only one type of tRNA synthetase in bacteria?
- Glutamine and cysteine
 - Glutamic acid and asparagine
 - Cystine and Valine
 - Glutamine and glutamic acid
95. Which of the following parts of the mRNA determines the specificity of the amino acid attached?
- Acceptor stem
 - Variable loop
 - Ψ U loop
 - D loop
96. X-ray diffraction patterns are used for studying crystal structure of solids because:
- They have very high energy, hence they can penetrate through solids
 - They are electromagnetic radiation, and hence do not interact with matter (crystals)
 - Their wavelengths are comparable to inter-atomic distances
 - Their high frequency enables rapid analysis
97. Which of the following cannot be used as bio-materials?
- Metals
 - Ceramics
 - Polymers
 - None of these
98. Steels mainly contain iron and carbon. Under which of the following categories do they belong?
- Metallic Solid
 - Polymer
 - Composites
 - Ceramics
99. Ceramics make excellent refractory materials. A material is said to be refractory if it:
- Resists the flow of electric current
 - Has high refractive index
 - Retains its strength at high temperatures
 - All of the above
100. Which of the following is true for polymers?
- They have very high molecular mass
 - They do not have linear stress-strain curve
 - They have high strength to mass ratio
 - All of the above