ENTRANCE EXAMINATION, 2017
M.Tech. Bioinformatics

Time: 2 hours **Maximum Marks: 75**

HALL TICKET NUMBER:

INSTRUCTIONS:

1. Answers are to be marked on the OMR answer sheet following the instructions provided there upon

2. Handover the OMR answer sheet at the end of the examination to the invigilator

3. The question paper contains 75 questions of multiple choice type printed in 13 pages including this page. OMR answer sheet provided separately.

4. The marks obtained in part A will be used for resolving the tie cases

5. All questions carry one mark each.

6. 0.33 marks will be deducted for every wrong answer

7. Non-programmable scientific calculators are permitted.

8. Cell/Mobile Phones are strictly prohibited in the examination hall.

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1. A compound with initial concentration, N, the time required for decomposition of half of the compound with ith order is inversely proportional to:
   A. N^{1-i}
   B. N^i
   C. N^{i-1}
   D. N^{i-2}

2. A hydrophilic colloidal sol is
   A. Starch sol
   B. Silver iodide sol
   C. Arsenous sulphide sol
   D. Barium sulphate sol

3. Alcohol dehydration involves
   A. Carbene
   B. Carbanion
   C. Carbonium ion
   D. Free radical

4. Glucose molecule reacts with following compound to give raise to osazone.
   A. Carbazene
   B. Phenol
   C. Phenyl hydrazine
   D. Hydroxyl amine

5. The NH_3 molecule has the following shape
   A. Bent
   B. Seesaw
   C. Trigonal pyramidal
   D. Pyramidal

6. The slope of the line which is perpendicular to the line segment (1, -4) and (-2, 2) is ....
   A. 1/2
   B. -1/2
   C. 2
   D. -2

7. The area of the circle with centre at origin and passing through (3,-4) is .... sq.units
   A. 25.0
   B. 8.0
   C. 78.5
   D. 32.5

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8. The value of Sin (210°) =
   A. 1
   B. -1
   C. 1/2
   D. -1/2

9. Four dice D1, D2, D3 and D4, each having six faces numbered 1, 2, 3, 4, 5, and 6, are rolled simultaneously. The probability that D4 shows a number appearing on one of D1, D2 and D3 is
   A. 91/216
   B. 108/216
   C. 125/216
   D. 127/216

10. If the sides of the two squares are in the ratio 2:1, the ratio of their areas will be --
    A. 1:2
    B. 3:1
    C. 4:1
    D. 3:4

11. HTTP stands for:
    A. Hyperlinked Text Type Protocol
    B. Hypertext Transfer Package
    C. Hypertext Transfer Protocol
    D. Hypertext Transmission Protocol

12. Which of the following is the feature of Object Oriented Programming
    A. Encapsulation
    B. Polymorphism
    C. Inheritance
    D. All of the above

13. Which generation of the computers used vacuum tubes for circuitry?
    A. First
    B. Second
    C. Third
    D. Fourth

14. The main working memory used by computers is
    A. ROM
    B. RAM
    C. Cache
    D. CD

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15. 1 KB is equivalent to
    A. 1000 bytes
    B. 1024 bytes
    C. 1000 MB
    D. 1024 MB

16. Momentum is defined as
    A. Mass × acceleration
    B. Mass × velocity
    C. Force × distance
    D. Mass × velocity^2

17. The energy possessed by a body due to its position or configuration is called ____ energy.
    A. Thermal
    B. Potential
    C. Kinetic
    D. Sound

18. Force = mass X ....
    A. Velocity
    B. Speed
    C. Acceleration
    D. Pressure

19. One kg of air is compressed from 1 m^3 to 0.5 m^3. Which of the following statements is true?
    A. The mass is halved
    B. The mass is doubled
    C. The density is doubled
    D. The density is halved

20. Coulomb's law describes ....
    A. Force acting on two charges separated by a distance
    B. Force acting between two objects separated by a distance
    C. Centripetal force acting due to rotation of body
    D. None of the above.

21. What is the purpose of a buffer system in electrophoresis?
    A. Alternate the current
    B. Disrupt the contaminants
    C. Stop the migration process
    D. Carry the current and protect the samples

22. Zika virus belongs to the family
    A. Filoviridae
    B. Flaviviridae
    C. Adenoviridae
    D. Geminiviridae

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23. Specialized animal cell that secretes a hormone into the blood
    A. Epithelial
    B. Neuronal
    C. Endocrine
    D. Muscle

24. The drug discovered by the Nobel Laureate Youyou Tu against Malaria is
    A. Quinine
    B. Quercetin
    C. Cinchonine
    D. Artemisinin

25. Which of the following amino acids has buffering capacity?
    A. Tryptophan
    B. Cysteine
    C. Arginine
    D. Histidine

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26. An amino acid has 0.032% sulphur, if each molecule has only one Sulphur atom. Number of molecules contained in 1 g of amino acid is
    A. 6.02×10^{23}
    B. 6.02×10^{19}
    C. 6.02×10^{18}
    D. 6.02×10^{21}

27. Greater probability of an orbital close to nucleus is
    A. 3d
    B. 3s
    C. 3p
    D. All are equally placed

28. Number of molecules inside 1.0 cm diameter soap bubble at 1 atm pressure and 25°C:
    A. 1.03×10^{23}
    B. 1.29×10^{19}
    C. 1.29×10^{22}
    D. 1.03×10^{20}

29. Osmotic pressure of 0.1M monobasic acid at pH = 2.0, T Kelvin is
    A. 0.11 RT
    B. 1.1 RT
    C. 0.01 RT
    D. 0.1 RT

30. In a reaction with zero activation energy, the rate constant at 280 K is 1.6×10^{-6} s^{-1}, what would be rate constant at 300 K.
    A. 1.6×10^{-5} s^{-1}
    B. 1.6×10^{-6} s^{-1}
    C. 3.2×10^{-6} s^{-1}
    D. Zero

31. Composition of Salt bridge is
    A. Agar-agar paste
    B. Calomel
    C. Corroosive sublimare
    D. All the above

32. Glucose does not react with
    A. HCN
    B. $NaHSO_3$
    C. NH_2OH
    D. None of the above

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33. Monochlorinated racemic mixture is formed by
    A. n-butane
    B. Neupetane
    C. 2,2,3,3-tetramethylbutane
    D. 2,3-dimethyl butane

34. A sample of HI(g) is placed in a flask at a pressure of 0.2 atm. At equilibrium the partial pressure of HI(g) is 0.04 atm. What is the Kp for the given equilibrium?
    $$2HI(g) \longleftrightarrow H_2(g) + I_2(g)$$
    A. 7
    B. 4
    C. 12
    D. 8

35. In the following equation the conjugate acid is
    $$NH_3 + H_2O \longrightarrow NH^+_4 + OH^-$$
    A. NH_3
    B. NH^+_4
    C. H_2O
    D. OH^-

36. The geometric mean of the numbers $2i$, $4i$, 6i and $8i$ is

    A. $i \sqrt[4]{384}$

    B. $\sqrt[4]{384i}$

    C. $-i \sqrt[4]{384}$

    D. $\sqrt[4]{384}$

37. The sequence, 1/2, 2/3, 3/4, 4/5, ... is
    A. Increasing and bounded
    B. Decreasing and bounded
    C. Increasing and not bounded
    D. Decreasing and not bounded

38. Square of the distance between two points (x1, y1, z1) and (x2, y2, z2) is given by ----
    A. $(x2-x1)^2 + (y2-y1)^2 + (z2-z1)^2$
    B. $(x2-x1) + (y2-y1) + (z2-z1)$
    C. $(x2-x1)^3 + (y2-y1)^3 + (z2-z1)^3$
    D. $(x2+x1)^2 + (y2+y1)^2 + (z2+z1)^2$

39. A cubical room of sides equal to 10 mts requires 2 Ton AC unit for optimum cooling. How many Tons of AC unit is required for optimal cooling if each side of the cubical room is doubled?
    A. 4 Tons
    B. 2 Tons
    C. 8 Tons
    D. 16 Tons

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40.
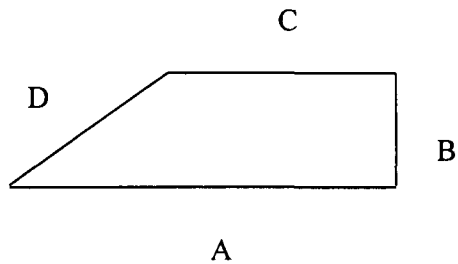
The lengths of the four sides of the quadrilateral are represented by A, B, C, and D. If you want to calculate the area of the quadrilateral, at least how many of the sides must we know to make the calculation?

A. All the four sides

B. Three of the four sides enough

C. only two of the sides enough

D. May be not enough data

41. Raj can type 10 pages in 5 minutes. As compared to Raj, Meghana takes twice the time to type half the number of pages. How much time is required in order to get 75 typed pages from Raj and Meghana together?

A. 25 minutes

B. 35 minutes

C. 40 minutes

D. 30 minutes

42. The dot product of the two vectors a and b which are perpendicular to each other is ...

A. 0

B. product of |a| and |b|

C. 1

D. None of the above

43. A value of P that is conventionally used while making statistical significance test is ---

A. >0.05

B. <0.5

C. >0.5

D. <0.05

44. If a and b are positive integers and (a-b)/3.5 = 4/7, then

A. b < a

B. b > a

C. b = a

D. b >= a

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45. If $13 = 13w/(1-w)$, then $(2w)^2 =$

    A. 1/4
    B. 1/2
    C. 1
    D. 2

46. Consider the following statements:
    int i = 4;
    int j = ++i;
    int k = j++;
    What are the values of j and k?
    A. 5 and 5
    B. 5 and 6
    C. 4 and 5
    D. 4 and 4
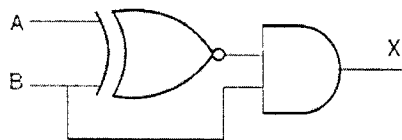
47. The decimal number equivalent to a binary number 100101 is
    A. 33
    B. 35
    C. 37
    D. 39

48. Format identifier for int data type in C is/are
    A. %d
    B. %i
    C. %f
    D. %d and %i both

49. For the logic circuit shown below in the figure, the required input combination to get the output X = 1 is

    A. A = 0, B = 0
    B. A = 0, B = 1
    C. A = 1, B = 1
    D. A = 1, B = 0

50. Which of the following language is used to set the visual style of a web document
    A. CSS
    B. JavaScript
    C. C
    D. R

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51. If a NAND gate with two inputs X and Y gives the output is 0 then
    A. X = 1, Y = 0
    B. X = 0, Y = 1
    C. X = 0, Y = 0
    D. X = 1, Y = 1

52. Programming language C was invented by
    A. Charles Babbage
    B. Dennis M. Ritchie
    C. Alan Turing
    D. Larry Wall

53. The network protocol commonly used for exchanging files over the Internet is
    A. HTTP
    B. FTP
    C. SMTP
    D. None of the above

54. In the field of machine learning NLP stands for
    A. Next Level Programming
    B. Natural Learning Programming
    C. Natural Language Programming
    D. Natural Language Processing

55. Which is the central/core part of an operating system?
    A. Kernel
    B. Shell
    C. Terminal
    D. BIOS

56. "An object at rest tends to stay at rest and an object in motion tends to stay in motion with the same speed and in the same direction unless acted upon by an unbalanced force". This is known as ...
    A. Newton's first law of motion
    B. Newton's second law of motion
    C. Newton's third law of motion
    D. none of the above

57. The dielectric constant of water is ....
    A. 0
    B. 10
    C. 40
    D. 80

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58. The motion of the pendulum in a working clock is an example of ...motion
    A. circular
    B. Harmonic
    C. Unharmonic
    D. Linear

59. The velocity of a freely falling body would increase by........ at the end of every second.
    A. 9.8 mts/sec
    B. 9.8 mts/sec^2
    C. 9.8 feet/sec
    D. 9.8 feet/sec^2

60. A body of mass 10 Kgs is seen approaching place B from place A at a velocity of 100 mt/sec. What might be its K.E. at the point A?
    A. 2500Kg.mt/sec
    B. 250Kg.mt/sec
    C. 50Kg.mt/sec
    D. None of the above

61. The sensation of being thrown out when sitting on the rim of a spinning wheel is due to ...
    A. Centripetal force
    B. Centrifugal force
    C. Gravitational force
    D. None of the above

62. In an electric motor, the kind of conversion that takes place is ....
    A. Chemical energy to mechanical energy
    B. Electrical energy to mechanical energy
    C. Electrical energy to light
    D. Electrical energy to chemical energy

63. Which of following is not an electromagnetic wave?
    A. gamma ray
    B. light ray
    C. X-ray
    D. cathode ray

64. Moment of inertia of a hollow sphere of mass M with radius r is
    A. $M.r^2$
    B. $M.r^2/2$
    C. $M.r^2/3$
    D. $2M.r^2/3$

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65. In the famous equation $E=mc^2$ derived by Albert Einstein, E, m and c stand for ---- respectively.
    A. energy, mass and a constant
    B. energy, mass and speed of light
    C. energy, momentum and a constant
    D. energy, momentum and speed of light

66. Tool used for finding the best match of a DNA sequence against a target database
    A. Local pairwise sequence alignment
    B. Global pairwise sequence alignment
    C. BLAST-N
    D. BLAST-P

67. The proteins are imported from cytosol into specialized organelles with the aid of
    A. Promoter sequences
    B. Introns
    C. Signal sequences
    D. Exons

68. Which one of the technique is used for quantification of mRNA?
    A. Nested PCR
    B. Gradient PCR
    C. Real time PCR
    D. Western blotting

69. Cytotoxic T cells are distinguished from Helper T cells by the presence of
    A. CD2
    B. CD3
    C. CD8
    D. Class II MHC antigen

70. Which of the following disease is not an autoimmune disease?
    A. Grave's disease
    B. Rheumatoid arthritis
    C. Lupus erythematosis
    D. Bovine spongiform encephalitis

71. During the organic extraction technique in which genetic material is isolated from other cellular components, which layer is the nucleic acid found after phase separation?
    A. Solid phase
    B. Lowermost phase
    C. Interface phase
    D. Uppermost phase

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72. Having become an expert on gel electrophoresis, you are asked to examine a gel for a colleague, where would you find the smallest segment of DNA?
   A. Near the negative electrode, close to the wells
   B. Near the negative electrode, at the bottom of the wells
   C. Near the positive electrode, farthest away from the wells
   D. Near the middle of the gel, they tend to slow down after the first few minutes

73. Which of the following can prevent ligation of the restriction enzyme digested plasmid vector
   A. Ligase
   B. Phosphatase
   C. DNA polymerase
   D. Reverse transcriptase

74. Mitochondrial DNA polymerase does not have an error checking mechanism such as that of nuclear DNA polymerase. This would be expected to lead to a higher rate of which type of mutation in mitochondrial DNA?
   A. Spontaneous mutations
   B. Induced mutations
   C. Deletion
   D. None of these

75. Which of the following statements concerning proteins is correct?
   A. The peptide bond is formed through a hydrolysis reaction
   B. Proteins are the only molecules that can catalyze reactions in the cell.
   C. Disulfide bonds are formed from ionic interactions between charged amino acids.
   D. Alpha helices are stabilized by hydrogen bonding between the carbonyl oxygen and the amide hydrogen of amino acids.

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