

Code No.

N – 3574

**Entrance Examination for Admission to the P.G. Courses in the Teaching
Departments, 2022**

CSS

**COMPUTATIONAL BIOLOGY (NGS DATA ANALYTICS/COMPUTER AIDED
DRUG DESIGN)**

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General Instructions

1. The Question Paper is having two Parts — Part 'A' Objective type (60%) & Part 'B' Descriptive type (40%).
2. Objective type questions which carry 1 mark each are to be (✓) 'tick marked' in the response sheets against the appropriate answers provided.
3. 4 questions are to be answered out of 8 questions carrying 10 marks each in Part 'B'.
4. **Negative marking** : 0.25 marks will be deducted for each wrong answer in Part 'A'.

Time : 2 Hours

Max. Marks : 100

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

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PART – A
(Objective Type)

Choose appropriate answer from the options in the questions. **One mark each.**

(60 × 1 = 60 marks)

1. Statement: Should all the drugs patented and manufactured in Western countries be first tried out on sample basis before giving license for sale to the general public in India?

Arguments:

Yes. Many such drugs require different doses and duration for the Indian population and hence it is necessary.

No. This is just not feasible and hence cannot be implemented.

- | | |
|------------------------------|-------------------------------|
| a) Only argument I is strong | b) Only argument II is strong |
| c) Either I or II is strong | d) Neither I nor II is strong |
| e) Both I and II are strong | |

2. "36, 34, 30, 28, 24, "Which number comes next in this series?

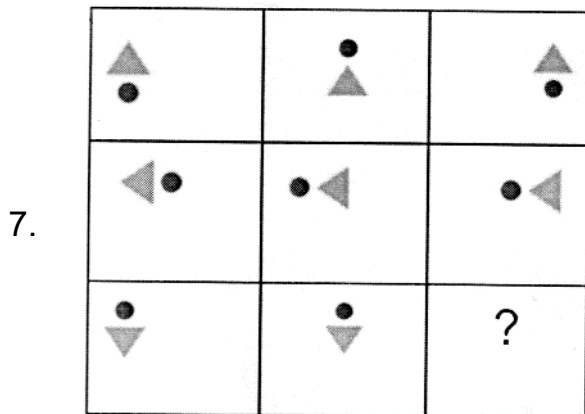
a) 22	b) 20
c) 23	d) 26
3. Safe: Secure :: Protect:

a) Lock	b) Sure
c) Guard	d) Conserve
4. Statement: Should young entrepreneurs be encouraged?
Arguments: Yes. They will help in the industrial development of the country.
Yes. They will reduce the burden on the employment market.

a) Only argument I is strong	b) Only argument II is strong
c) Either I or II is strong	d) Neither I nor II is strong
e) Both I and II are strong	
5. ELFA, GLHA, ILJA, _____ MLNA

a) OLPA	b) KLMA
c) LLMA	d) KLLA
6. ZA5, Y4B, XC6, W3D, _____

a) E7V	b) V2E
c) VE5	d) VE7



- a) 
- b) 
- c) 
- d) 

8. Pointing to a photograph. Vipul said, "She is the daughter of my grandfathers only son." How is Vipul related to the girl in the photograph?
 - a) Father
 - b) Brother
 - c) Cousin
 - d) Uncle
9. Pointing to the lady in the photograph, Mrinalini said, Her son's father is the only son-in-law of my mother". How is Mrinalini related to the lady?
 - a) Sister
 - b) Mother
 - c) Cousin
 - d) None of these
10. Direction: Study the following information carefully to answer the given questions. Six students i.e. Z, J, C, A, B and N study in six different classes i.e. II, IV, V, VII, VIII and Xth. They are standing in a seminar hall according to their classes in descending order. B studies in higher class with respect to C. N studies in lower class with respect to J. A studies in class VI and in lower class with respect to J. Z does not study in class II, VIII and X. B studies in lower class with respect to N. A studies in higher class with respect to B and B does not study in class IV. Which of the following statements is false?
 - a) B studies in class V
 - b) N study in higher class with respect to Z
 - c) Z studies in lower class with respect to C
 - d) J studies in class X
11. Arrange the given words Alphabetical Order and choose the one that comes third.
 - a) Science
 - b) Scrutiny
 - c) Scripture
 - d) Scramble
12. In the dictionary, which word comes fourth in arrangement?
 - a) Propense
 - b) Prophet
 - c) Prong
 - d) Propine
13. What should come next in the following letter sequence?
A A B A B C A B C D A B C D E A B C D
 - a) A
 - b) E
 - c) C
 - d) B

14. How many independent words can TRACKSUIT' be divided into without changing the order of the letters and using each letter only once?
 - a) Two
 - b) Three
 - c) One
 - d) Four
15. Direction: Follow the given pattern to answer the questions
M \$ 9 L 7 1 6 A # 9 B Z \$ J U & 5 R 3 I 7 @ & M I 6 R 2 F S @ I
If all the symbols from the above arrangement are dropped, which of the following element will be the 12th from the left end?
 - a) J
 - b) 5
 - c) R
 - d) U
16. Cube is related to Square in the same way as Square is related to
 - a) Line
 - b) Triangle
 - c) Point
 - d) Plane
17. In each of the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it, Choose the correct alternative.
b__abbc__bbca____bcabb____ab
 - a) acaa
 - b) acba
 - c) cabc
 - d) cacc
18. A man is facing west. He turns 45 degrees in the clockwise direction and then another 160 degrees in the same direction and then 270 degrees in the anticlockwise direction. Find which direction he is facing now?
 - a) South-West
 - b) West
 - c) South
 - d) East-South
19. A child is looking for his father. He went 90 metres in the east before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From there, he went 100 metres to his north before meeting his father in a street. How far did the son meet his father from the starting point?
 - a) 80 m
 - b) 100 m
 - c) 140 m
 - d) 180 m

20. Lemon is between mango and apple but just opposite to guava. Banana is at one end of a line and is to the right of a guava tree. A raspberry tree which at one end of a line, is just diagonally opposite to a mango tree. Which tree is just opposite to the banana tree?

- | | |
|-----------|------------------------|
| a) Mango | b) Pomegranate |
| c) Papaya | d) Data is inadequate. |

21. Study the following data carefully and answer the questions accordingly.

C * D means C is 12m north of D.

C @ D means C is 6m east of D.

C \$ D means C is 14m west of D.

C % D means C is 8m south of D.

U* Y \$ E*D \$ P % R

According to the following expression, point E is in which direction of point P?

- | | |
|---------------|---------------|
| a) East | b) South |
| c) North-West | d) North-East |

22. Four people of different nationalities live on the same side of a street in four houses each of different color. Each person has a different favorite drink. The following additional information also known:

- The Englishman lives in the red house
- The Italian drinks tea.
- The Norwegian lives in the first house on the left.
- In the second house from the right they drink milk
- The Norwegian lives adjacent to the blue house
- The Spaniard drinks fruit juice
- Tea is drunk in the blue house.
- The White House is to the right of the red house

Find out who drinks milk.

- | | |
|--------------|------------------|
| a) Norwegian | b) Englishman |
| c) Italian | d) None of these |

29. If $0.75x :: 5 : 8$, then x is equal to:
- a) 1.12
 - b) 1.2
 - c) 1.25
 - d) 1.30
30. The sum of three numbers is 96. 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
31. What is Unix?
- a) Unix is a programming language
 - b) Unix is a software program
 - c) Unix is an operating system
 - d) Unix is a text editor
32. The Unix shell is both _____ and _____ language.
- a) scripting, interpreter
 - b) high level, low-level
 - c) interactive, responsive
 - d) interpreter, executing
33. FTP stands for
- a) File transfer protocol
 - b) File transmission protocol
 - c) Form transfer protocol
 - d) Form transmission protocol
34. Ethernet system uses which of the following technology.
- a) Bus
 - b) Ring
 - c) Star
 - d) Tree
35. What is a compiler?
- a) System program that converts instructions to machine language
 - b) System program that converts machine language to high-level language
 - c) System program that writes instructions to perform
 - d) None of the above

36. Who created the first DBMS?
- a) Edgar Frank Codd
 - b) Charles Bachman
 - c) Charles Babbage
 - d) Sharon B. Codd
37. In which of the following formats, data is stored in the database management system?
- a) Image
 - b) Text
 - c) Table
 - d) Graph
38. Diagrammatic Representation of Algorithm
- a) Flowchart
 - b) Dataflow Diagram
 - c) Algorithm Design
 - d) Pseudo Code
39. Which of the following command is used to count the total number of lines, words, and characters contained in a file?
- a) wcount
 - b) countw
 - c) WC
 - d) None of the above
40. Choose the TCP/IP Protocol which is used for remote terminal connection service?
- a) FTP
 - b) UDP
 - c) RARP
 - d) TELNET
41. Which ratio is constant for DNA?
- a) $A + G / T + C$
 - b) $A + T / G + C$
 - c) $A + C / U + G$
 - d) $A + U / G + C$
42. The disruption of nucleosomal structure is due to
- a) Acetylation
 - b) Carboxylation
 - c) Phosphorylation
 - d) Methylation

43. No. of nucleotides found in DNA segment if it contains 100 Adenine and 100 cytosines,
- a) 100
 - b) 200
 - c) 400
 - d) 50
44. The stability of an α -helix is not affected by which of the following?
- a) Bulkiness
 - b) Occurrence of alanine and glycine residues
 - c) Electrostatic repulsion
 - d) Interaction between R groups spaced three residues apart
45. Which of the following enzyme catalyzes a reaction that introduces reduced nitrogen into cellular metabolism?
- a) Bacterial dinitrogenase reductase
 - b) Phosphatase
 - c) Bacterial glutamine synthase
 - d) Bacterial dinitrogenase oxidase
46. Which of the following is true about the Z-DNA helix?
- a) It has fewer base pairs per turn than B-DNA
 - b) It tends to be found at the 3' end of the genes
 - c) It has alternating GC sequences
 - d) It is a permanent conformation of DNA
47. Which of the following hormone is responsible for the activation of phospholipase C?
- a) Adrenaline
 - b) Serotonin
 - c) Cortisol
 - d) Vasopressin
48. Which of the following proteins does not function in cell-cell interaction?
- a) Cadherin
 - b) Cytochrome c
 - c) Integrin
 - d) N-CAM
49. How many types of signal transducers are there?
- a) 6
 - b) 7
 - c) 8
 - d) 4

50. Which of the following is not correct about phosphorylation by IRS on serine residue?
- Target tissues fail to respond to circulating insulin
 - It increases insulin levels
 - It is an inhibitory phosphorylation
 - It is molecular mechanism for insulin resistance
51. Which of the following occurs in meiosis but not in mitosis?
- Pairing of homologous chromosomes at metaphase plate
 - Separation of sister chromatids at anaphase
 - Attachment of spindle fibers to kinetochore
 - Replication of DNA prior to start of cell division
52. Which of the following is a measure of how responsive the enzyme is to changes in the concentration of a metabolite?
- Metabolic control
 - Response coefficient
 - Flux control coefficient
 - Elasticity coefficient
53. Which of the following is the correct sequence for the movement of electrons during the light-dependent reactions of plants?
- P_{680} , water, P_{700} , $NADP^+$
 - Water, P_{680} , P_{700} , $NADP^+$
 - P_{700} , P_{680} , $NADP^+$, water
 - Water, P_{700} , $NADP^+$, P_{680}
54. Which of the following class of drugs reduce the levels of fatty acids circulating in the blood?
- Amphetamines
 - Thiazolidinediones
 - Synthetic cannabinoids
 - Cathinones
55. Which of the following plays a substantial role in inking together sister chromatids immediately after replication?
- Topoisomerases
 - Histones
 - Condensins
 - Cohesins

56. Which of the following process occurs in regions where no large—scale sequence similarity is apparent?
- a) Site specific recombination
 - b) Replicative recombination
 - c) Homologous genetic recombination
 - d) Non-homologous recombination
57. TBP stands for?
- a) Transcription factor binding protein
 - b) Transcription associated factor
 - c) TATA box polymerase
 - d) TATA-box binding protein
58. Which of the following is an example of Epimers?
- a) Glucose and Ribose
 - b) Glucose and Galactose
 - c) Galactose, Mannose and Glucose
 - d) Glucose. Ribose and Mannose
59. Which of the following is carried out when cAMP functions as a second messenger?
- a) Acts second in importance to AMP
 - b) Activates all cytosolic protein kinases
 - c) Activates the cAMP-dependent protein kinase
 - d) Acts outside the cell to influence cellular processes
60. An aldohexose will have _____ stereoisomers.
- | | |
|-------|-------|
| a) 8 | b) 10 |
| c) 14 | d) 16 |

ANSWER SHEET — PART – A

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E

21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E
26	A	B	C	D	E
27	A	B	C	D	E
28	A	B	C	D	E
29	A	B	C	D	E
30	A	B	C	D	E
31	A	B	C	D	E
32	A	B	C	D	E
33	A	B	C	D	E
34	A	B	C	D	E
35	A	B	C	D	E
36	A	B	C	D	E
37	A	B	C	D	E
38	A	B	C	D	E
39	A	B	C	D	E
40	A	B	C	D	E

41	A	B	C	D	E
42	A	B	C	D	E
43	A	B	C	D	E
44	A	B	C	D	E
45	A	B	C	D	E
46	A	B	C	D	E
47	A	B	C	D	E
48	A	B	C	D	E
49	A	B	C	D	E
50	A	B	C	D	E
51	A	B	C	D	E
52	A	B	C	D	E
53	A	B	C	D	E
54	A	B	C	D	E
55	A	B	C	D	E
56	A	B	C	D	E
57	A	B	C	D	E
58	A	B	C	D	E
59	A	B	C	D	E
60	A	B	C	D	E

COMPUTATIONAL BIOLOGY (NGS DATA ANALYTICS/COMPUTER AIDED DRUG DESIGN)

PART – B

(Descriptive Type)

Answer **any four** questions. Each carries 10 marks. **(4 × 10 = 40 Marks)**

1. How are post-translational modifications important to maintain the integrity of the cell and its normal functioning?
2. Discuss different methods used for determining protein structure including both laboratory and in silico methods.
3. Can the application of programming in biology be useful in future. Discuss.
4. Write a note on macrophages and their role in the maintenance of the immune system.
5. Protein structure and function are interrelated and interdependent. Comment.
6. What is SARS-CoV-2? What is its target? How can it be prevented?
7. Describe the main characteristic features and organization of DNA with a neat diagram.
8. Enzymes A and B are Isoenzymes and has a K_m value of 10^{-3} mol/l and 10^{-2} mol/l for substrate C.
 - (a) Which of the two enzymes have greater affinity for substrate C
 - (b) Which of the two enzymes is more active when concentration of C is high.

