Question Booklet Series: **A** *Question Booklet Serial No.* 315022

Ph. D. Entrance Test – 2015

Subject: System Biology and Bioinformatics

Paper – I

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No. *In Figure* *In Words*

O.M.R. Answer Sheet Serial No.

Signature of Candidate: _____ *Signature of Invigilator:* _____

Time: 60 Minutes **Number of Questions: 50** **Maximum Marks: 50**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains 60 Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen. There shall be no negative marking for wrong answers.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
14. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
15. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

Q.1 The most widely used protein modelling tool, Swiss–Model is available at one of the following servers

A) NCBI
B) DDBJ
C) ExPASy
D) TIGR

Q.2 All of the following types of Histone modifications constitute the Histone code, except

A) Phosphorylation
B) Methylation
C) Ubiquitination
D) Teichoic acid attachment

Q.3 Life sciences research has been extremely facilitated by PMC. PMC stands for

A) A protein modelling centre available at NCBI
B) A digital archive of peer reviewed journals in life sciences
C) A multiple sequence alignment method for proteins
D) A method to relate mutated proteins to cancer

Q.4 While purifying proteins from a HPLC-Anion Exchange column, the order of the Proteins eluting from resin of the column would be

A) Least anionic followed by strong anionic
B) Strong anionic followed by least anionic
C) There is no such order in HPLC-ion exchange
D) Order will be determined by the pressure applied on HPLC column

Q.5 Identify the statement not true for 'lead optimization' process

A) A putative lead compound for therapeutic purpose selected
B) It is converted into a form with maximal activity by computer aided approach
C) It is selected in a form with minimal side effects
D) It is virtually tested with bioavailability properties

Q. 6 Proteolytic enzymes like trypsin , chymotypsin are biosynthesized in inactive form known as

A) Zymogens
B) Proteozymes
C) Apoenzymes
D) Prenzymes

Q. 7 GROMOS is UNIX program for all the following function except

A) Molecular dynamic simulation of nucleic acids
B) Molecular dynamic simulation of proteins
C) Energy minimization
D) Searching lead molecule

Q.8 Virtual cell modelling and analysis software has been developed by

A) National resource of cell analysis and modelling
B) National resource of cell biology and modelling
C) National repository of cell analysis and modelling
D) National repository of cell biology and modelling

Q.9 SBDD is an iterative process in protein-ligand complex recognition. The term implies to

A) Structural biology Drug-design
B) Systems biology based Drug-design
C) Structure based Drug-design
D) Structure biology Drug-docking

Q.10 In the process of amino acid activation, the activated amino acid joins with t-RNA by which of the following bonds?

A) Peptide bond
B) Ionic bond
C) Ester bond
D) Disulphide bond

Q.11 The plant seedling are given energy and material for a new plant from stored fatty acids by glyoxysomes which are a specialized type of

A) Lysosomes
B) Microsomes
C) Peroxisomes
D) Liposomes

Q.12 Polymerase Chain reaction also finds its application in

A) Site specific recombination
B) Site directed mutagenesis
C) Site specific translocation
D) Site directed isomerization

Q. 13 Identify the statement that is not true for structural features of A-type of DNA

A) It is a right handed helix
B) Glycosidic bond conformation is anti
C) Helix rise per base pair 3.4 Å
D) Helix pitch 34Å

Q.14 Which of the following represents the three dimensional structure of tRNA

A) Clover leaf
B) L- shaped
C) Octagonal
D) Twisted leaf

Q. 15 Endoplasmic reticulum (ER) resident proteins that shuttle between (ER) and Golgi compartments typically possess the retrieval signal

A) KEDL
B) KDEL
C) ERGIC
D) ERGCI

Q.16 The production of red blood cells in the bone marrow is regulated by

A) Erythropoietin
B) Leukotriene
C) Prostaglandin
D) Lymphokine

Q.17 The MS-MS analysis can be done to analyse the following aspects of protein chemistry, except

A) Protein sub cellular localization
B) Post translational modifications
C) Sequence analysis
D) Mass analysis

Q.18 In order to construct the restriction map of genome provided, you will perform all the following except

A) Partial hydrolysis of DNA
B) Quantization of DNA content after hydrolysis
C) Electrophoretic resolution of the genomic fragments
D) Staining the gels for identification

Q.19 The full form for 'Phylip' is

A) Phylogeny editing program
B) A synonym for phylogeny analysis
C) Phylogeny inference package
D) A type of bioinformatics programming language

Q.20 PDB identifier is assigned by

A) Three character alphanumeric identifier
B) Four character alphanumeric identifier
C) Five character alphanumeric identifier
D) Six character alphanumeric identifier

Q.21 Identify the globular protein from the list mentioned below

A) Pepsin
B) Keratin
C) Fibroin
D) collagen

Q.22 The text scanning operations exercised in computational biology analysis is referred as

A) Pairing
B) Parsing
C) Prunning
D) Perling

Q.23 The degeneracy of a genetic codon means

A) A given base triplet can code for more than one amino acid
B) A given amino acid can be coded by more than one triplet
C) The base triplets in the code sequence are variant for the organisms
D) The base position in a codon is not important for coding

Q.24 The growth factors secreted by cells exhibiting their function on cells in immediate vicinity to the emitting cells is referred as

A) Paracrine
B) Autocrine
C) Endocrine
D) Juxtacrine

Q.25 The Hapten is _____ Reacting with preformed antibodies

A) A epitope
B) A paratope
C) A chemical group
D) A carrier

Q.26 The double stranded DNA sample has been denatured, it pertains

A) Breaking into short double stranded stretches
B) Complete breaking of DNA backbone
C) Separation into single strands
D) Hydrolysis of the bases from the sugar backbone

Q.27 A replicon is defined as

A) The DNA sequences specified and replicated during a single replication initiation event
B) The DNA sequences specified and replicated during a complete replication event
C) The polymerases used in replicating in a single prokaryotic replication event
D) The polymerases used in replicating in a single Eukaryotic replication event

Q.28 The Pribnow box has a consensus nucleotide sequence , identify the correct one

A) TAATAA
B) TATAAT
C) TTAATT
D) TTATAT

Q.29 The Spectroscopic analysis of which pair of amino acid will have the absorbance maxima at 280nm?

A) Trp and Pro
B) Trp and Tyr
C) Tyr and His
D) Tyr and Pro

Q.30 Identify the component that stimulates a specific RNA transcription from either an upstream or downstream position

A) Leucine zipper element
B) Zinc finger element
C) Enhancer element
D) Any protein element

Q.31 Identify the statement not true for Pharmacophore mapping

A) It is an approach to identify lead compounds.
B) Specific 3-D arrangements of functional groups within a molecular framework are assessed.
C) Novel compounds fitting the model can be identified.
D) The compound fitting it is always the best drug generated.

Q.32 Which of the following is exploited in generating a continuous cell line

A) In vitro fertilization
B) In vitro transcription
C) Cell free translation
D) In vitro transformation

Q.33 Protein crystal structure characterization occurs subsequent to which of the following steps

A) Protein isolation > purification> Gene cloning > X-ray crystallography
B) Gene cloning >Protein extraction > purification> X-ray crystallography
C) Gene cloning> Protein purification > extraction > X-ray crystallography
D) Protein isolation > purification> precipitation > X-ray crystallography

Q.34 During which of the protein synthesis steps G-protein play a crucial role

A) Activation step
B) Initiation step
C) Elongation step
D) Termination step

Q.35 Which of the following is not a component of extracellular marix in mammals?

A) Laminin
B) Gelatin
C) Fibronectine
D) Vitronectine

Q. 36 Guanine rich polynucleotides in telomers form cyclic tetramers known as G-quartets. This type of aggregation is due to

A) Hoogsteen base pairing
B) Double hydrogen bond base pairing
C) Triple hydrogen bond base pairing
D) Ionic base pairing

Q. 37 A friendly competition held biannually to assess the programs and methods in *ab initio* structure prediction

A) CASM
B) CASP
C) SPD
D) SAM

Q.38 In a preliminary study you have accidently mixed the sample of enzyme with an irreversible enzyme inhibitor. Now, if you dilute the sample by 100 fold and remeasure the activity, what is the possible outcome?

A) Dilution will lower the enzyme activity by 100 fold.
B) Dilution will increase the enzyme activity by 100 fold.
C) Dilution will not impact the enzyme activity.
D) Dilution will influence the enzyme activity dependent on type of inhibitor

Q. 39 The accuracy of a prediction program can be evaluated by the following parameters, except

A) Specificity
B) Sensitivity
C) Correlation coefficient
D) Eucledian distance

Q. 40 In an iterative process the distant homologs of a query sequence were searched using a profile generated from high scoring hits, the algorithm used is

A) PSI-BLAST
B) MEGA BLAST
C) tBLASTx
D) BLASTclust

Q. 41 Identify the statement not true for PAM matrices

A) PAM matrices are largely the efforts of Margaret Dayhoff and colleagues.
B) PAM matrices are based on the evolutionary model from alignments of related sequences.
C) Pam matrix selection appropriate for a give sequence alignment does not depend on how closely the sequences are believed to be related.
D) PAM 1 is used to compare closely related sequences.

Q. 42 In GEO microarray data for samples, platforms and series all of the submissions must be ____ compliant.

A) MIAME
B) SOFT
C) CEL
D) AFFYMETRIX

Q. 43 Which of the following is not a constituent database of KEGG?

A) PATHWAY
B) GENES
C) LIGAND
D) DOCK

Q. 44 In a chain termination sequencing procedure too much ddNTP are present, what would be the outcome

A) Newly synthesized chains terminated less frequently
B) Newly synthesized chains terminated more frequently
C) Newly synthesized chains are not made
D) Newly synthesized chains are made at the same rate as normal reaction mix.

Q. 45 In Cynaogen bromide cleavage of a polypeptide it reacts specifically with

A) Met residues and cleaving on C-terminal side of peptide bond
B) Met residues and cleaving on N-terminal side of peptide bond
C) Ser residues and cleaving on C-terminal side of peptide bond
D) Ser residues and cleaving on N-terminal side of peptide bond

Q. 46 Although most of the amino acids in a peptide group assume trans conformation, but _____ can follow cis conformation due to _____

A) Pro, reduced steric interference
B) Pro, increased steric interference
C) Gly, reduced steric interference
D) Gly, increased steric interference

Q. 47 SAGE is a high through put technique for

A) Sequence analysis of gene expression
B) Serial analysis of gene expression
C) Set wise analysis of gene expression
D) Structure based analysis of gene expression

Q. 48 'Dicer' is the name given to homodimer protein with ~1900 residues subnits. The function of this protein is

A) ATP-dependent RNase
B) ATP-dependent DNase
C) ATP-independent RNase
D) ATP-independent DNase

Q. 49 The physiological inducer of the *lac* operon system is

A) 1,6 – allolactose
B) 1,4 – allolactose
C) Isopropylthiogalactoside
D) Isobutylthiogalctoside

Q. 50 The two proteins involved in executing the xenobiotic metabolism are

A) Cytochrome P450 and NADPH P450 reductase
B) Cytochrome P450 and NADH P450 reductase
C) Cytochrome C and NADPH Cytocrome C reductase
D) Cytochrome C and NADH Cytochrome C reductase