

COMMON P. G. ENTRANCE TEST – 2020

Test Booklet No. :

DEPT. OF HIGHER EDUCATION, GOVT. OF ODISHA

TEST BOOKLET

Subject Code **50**

Subject **BIOINFORMATICS**

Time Allowed : **90 Minutes**

Full Marks : **70**

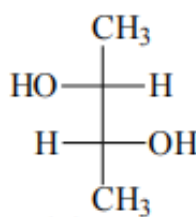
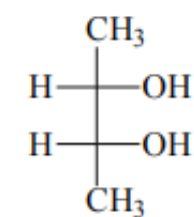
: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. You have to enter your **Hall Ticket No.** on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
3. **YOU ARE REQUIRED TO FILL UP & DARKEN HALL TICKET NO. & TEST BOOKLET NO. IN THE ANSWER SHEET AS WELL AS FILL UP TEST BOOKLET SERIAL NO. & ANSWER SHEET SERIAL NO. IN THE ATTENDANCE SHEET CAREFULLY. WRONGLY FILLED UP ANSWER SHEETS ARE LIABLE FOR REJECTION AT THE RISK OF THE CANDIDATE.**
4. **This Test Booklet contains 70 items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose ONLY ONE response (answer) for each item (question).**
5. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
6. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. **There is no negative marking.**
7. **After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the Answer Sheet issued to you. You are allowed to take with you the candidate's copy / second page of the Answer Sheet along with the Test Booklet, after completion of the examination, for your reference.**
8. Sheets for rough work are appended in the Test Booklet at the end.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

1. The Kinetic Energy of the electron in an orbit of radius r in hydrogen atom is proportional to :
- (A) e^2/r (B) $e^2/2r$
(C) $2e^2/r$ (D) $e^2/3r$
2. Which of the following is equivalent to 1 atomic mass unit ?
- (A) Half of mass of a hydrogen atom
(B) Half of a mass of a helium atom
(C) One by seventh of a Oxygen atom
(D) One by twelfth of a carbon atom
3. A metal coin is at bottom of a beaker filled with a liquid of refractive index = $4/3$ to height of 6 cm. To an observer looking from above the surface of liquid, coin will appear at a depth of :
- (A) 8 cm (B) 6.75 cm
(C) 4.5 cm (D) 7.5 cm
4. Mirage is a phenomenon due to :
- (A) Refraction of light
(B) Reflection of light
(C) Total internal reflection of light
(D) Diffraction of light
5. Resolution power of microscope does not depend on :
- (A) Wavelength of light
(B) Focal length of objective
(C) Refractive index of medium between the object and objective
(D) Semi vertical angle of cone of light from object to objective
6. Which of the following bonding is strongest ?
- (A) C-O (B) C-C
(C) C-S (D) C-H

7. Which of the following is one of the reason so that life was first started in aqueous environment ?
- (A) Due to low specific heat of water
 (B) Due to low heat of vaporization of water
 (C) Due to low density of ice than water
 (D) Due to high water potential of water
8. All bonds in benzene are equal due to :
- (A) Inductive effect (B) Resonance
 (C) Tautomerism (D) Isomerism
9. An aqueous solution has a hydrogen ion concentration of 0.001 M. Its pH will be :
- (A) 2 (B) 3
 (C) 8 (D) 9
10. The relationship between the following two structures is :



- (A) Enantiomer
 (B) Structural isomer
 (C) Identical
 (D) Diastereomer
11. In a language survey of students it is found that 80 students know English, 60 know French, 50 know German, 30 know English and French, 20 know French and German, 15 know English and German and 10 students know all the three languages. How many students know at least one language ?
- (A) 135 (B) 30
 (C) 10 (D) 45

12. In a beauty contest, half of the experts voted for Mr. A and two thirds voted for Mr. B. 10 voted for both and 6 did not vote for either. How many experts were there in all ?
- (A) 18 (B) 36
(C) 24 (D) None of these
13. If X, Y, Z are sets such that $X \subset Y$ and $Y \subset Z$, then :
- (A) $X \cup Y = Z$
(B) $X \cap Y = Z$
(C) $X \cap Y \cap Z = Z$
(D) None of these
14. If 50% of $(p - q) = 30\%$ of $(p + q)$, then $p : q$ is equal to :
- (A) 4 : 1 (B) 5 : 3
(C) 3 : 5 (D) 1 : 4
15. If $A^{2x+2} = 1$, where 'A' is a positive real number other than 1, then x is equal to :
- (A) -2 (B) -1
(C) 0 (D) 1
16. Plants which produce characteristic pneumatophores and show vivipary belongs to :
- (A) Mesophytes
(B) Psammophytes
(C) Halophytes
(D) Hydrophytes
17. Xylem translocates :
- (A) Water only
(B) Water and mineral salts only
(C) Water, mineral salts and some organic nitrogen only
(D) Water, mineral salts, some organic nitrogen and hormones

18. Placentation in which ovules develop on the inner wall of the ovary in peripheral part is :
- (A) Basal (B) Axile
(C) Parietal (D) Free central
19. Vascular bundles in a dicot stem are :
- (A) Open, collateral, exarch
(B) Open, collateral, endarch
(C) Closed, collateral, endarch
(D) Closed, collateral, exarch
20. Lateral root originates from :
- (A) Endodermal cells lying against protoxylem
(B) Pith cells
(C) Epidermal cells
(D) Pericycle cells lying against protoxylem
21. In human, bipolar neurons are found in :
- (A) Brain
(B) Spinal cord
(C) Embryonic stages
(D) Olfactory epithelium
22. During growth period release of too much growth hormone can lead to :
- (A) Cretinism (B) Acromegaly
(C) Gigantism (D) Simmond's disease
23. The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge, is called :
- (A) Natural selection (B) Convergent evolution
(C) Adaptive radiation (D) Divergent evolution

24. Humans use haemoglobin to carry oxygen in their blood. Similarly, mollusks and crustaceans use _____ to carry oxygen in their blood.
- (A) Hemovanadin (B) Hemerythrin
(C) Haemoglobin (D) Hemocyanin
25. Which of the following features is used to identify a male cockroach from a female cockroach ?
- (A) Presence of a boat shaped sternum on 9th abdominal segment
(B) Presence of caudal styles
(C) Fore wings with darker tegmina
(D) Presence of anal cerci
26. Immunosuppressive drugs like cyclosporin delay the rejection of graft post organ transplantation by :
- (A) Inhibiting T cell infiltration
(B) Killing B cells
(C) Killing macrophages
(D) Killing dendrite cells
27. Which antibody is known to responsible for allergic reaction ?
- (A) Ig M (B) Ig A
(C) Ig E (D) Ig D
28. Which polymerase enzyme adds nucleotides without taking the help of template ?
- (A) Telomerase (B) DNA polymerase I
(C) RNA polymerase III (D) PAP
29. The 'rho' factor is involved :
- (A) To increase the rate of RNA synthesis
(B) In binding catabolic repressor to the promoter region
(C) In proper termination of transcription
(D) To allow proper initiation of termination

30. Taq DNA polymerase differs from the Klenow fragment in having :
- (A) 5'-3' polymerase activity (B) 5'-3' exonuclease activity
(C) 3'-5' exonuclease activity (D) Endonuclease activity
31. The 5' cap of RNA is required for the :
- (A) Transport of RNA only
(B) Stability, protection and transport of RNA
(C) Methylation of RNA
(D) Stability of RNA only
32. Which of the following statement is correct about prokaryotic gene expression ?
- (A) Prokaryotic mRNAs must have introns spliced out
(B) Prokaryotic mRNAs are often translated before transcription is completed
(C) Prokaryotic mRNAs contain the transcript of only one gene
(D) All of these statements are correct
33. Assume a spherical mammalian cell has a diameter of 27 microns. If a polypeptide chain with alpha helical conformation has to stretch across the cell, how many amino acids should it be comprised of ?
- (A) 180000 (B) 1800
(C) 27000 (D) 12000
34. Enzymes which catalyse linking of C-O, C-S, C-N, P-O, etc bonds, belong to which of the following category ?
- (A) Isomerase
(B) Ligases
(C) Lyases
(D) Transferases
35. Under certain conditions pyruvate can be allowed to decarboxylate into acetyl CoA and CO₂. For evolution of ¹⁴C labeled carbon in CO₂, which carbon atom must be radiolabelled in glucose prior to glycolysis ?
- (A) C1 or C6 (B) C2 or C3
(C) C3 or C4 (D) C5 or C2

36. All enzymes of TCA cycle are located in the mitochondrial matrix except one, which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is :
- (A) Succinate dehydrogenase (B) Lactate dehydrogenase
(C) Isocitrate dehydrogenase (D) Malate dehydrogenase
37. A competitive inhibitor of an enzyme usually :
- (A) Does not bind to the active site
(B) Resembles the normal substrate
(C) Lowers the V_{max} of the enzyme
(D) Binds to the enzyme in a cooperative fashion
38. The purification and recovery of the production after fermentation is called :
- (A) Upstream process (B) Downstream process
(C) Surface fermentation (D) None of these
39. RFLP analysis is a technique that :
- (A) Uses hybridization to detect specific DNA restriction fragments in genomic DNA
(B) Is used to determine whether a gene is transcribed in specific cells
(C) Measures the transfer frequency of genes during conjugation
(D) Is used to detect genetic variation at the protein level
40. In a biotechnology applications, a selectable marker is incorporated in a plasmid to :
- (A) Increase its copy number
(B) Increase the transformation efficiency
(C) Eliminate the non-transformants
(D) Increase the expression of the gene of interest
41. To select a gene of interest from a genomic library one can use :
- (A) Restriction enzyme (B) DNA probe
(C) Cloning vector (D) Secondary Antibody

42. The process of finding relative location of genes on a chromosome is called :
- (A) Gene tracing (B) Genome mapping
(C) Genome walking (D) Chromosome walking
43. Peroxisome is involved in :
- (A) Cell death by Apoptosis
(B) Detoxification from free radicals
(C) Cell plate formation in cytokinesis
(D) Nutrient recycling by Autophagy
44. Tracing of a cell lineage during development means that :
- (A) The cells giving rise to and derived from a specific cell are known
(B) The sequence of the enhancers for developmental genes is known
(C) The regulatory genes for the organism have been genetically mapped
(D) Cell components in the membrane involved in signaling have been isolated
45. Which of the following processes leads to DNA ladder formation ?
- (A) Necrosis (B) Plasmolysis
(C) Apoptosis (D) Mitosis
46. A cross between two true breeding lines, one with dark blue flowers and one with bright white flowers produces F1 offspring that are light blue. When F1 progeny are selfed a 1:2:1 ratio of dark blue to light blue to white flowers is observed. What genetic phenomenon is consistent with these results ?
- (A) Epistasis (B) Incomplete dominance
(C) Codominance (D) Inbreeding depression
47. Assuming Hardy-Weinberg equilibrium, the genotype frequency of heterozygotes, if the frequency of the two alleles at the gene being studied are 0.6 and 0.4, will be :
- (A) 0.80 (B) 0.64
(C) 0.48 (D) 0.32

48. Which of the following genotype will produce 4 different types of gametes ?
- (A) AAbbccddEE (B) aaBbCCdd
(C) AaBbCC (D) Aabb
49. Which of the following is correct regarding AIDS causative agent HIV ?
- (A) HIV is enveloped virus containing one molecule of single stranded RNA and one molecule of reverse transcriptase
(B) HIV is enveloped virus containing two identical molecules of single stranded RNA and two molecule of reverse transcriptase
(C) HIV is unenveloped retrovirus
(D) HIV does not escape but attacks the acquired immune response
50. Which of the following does not occur during bacterial conjugation ?
- (A) Direct contact between donor and recipient cells
(B) Shortening of the pilus
(C) Enzymatic cleavage of one strand at the origin of the transfer
(D) Unidirectional transfer of both DNA strands
51. The peptidoglycans of bacteria consist of :
- (A) Sugars, D-amino acids and L-amino acids
(B) Sugars and D-amino acids
(C) Sugars and L-amino acids
(D) Sugars and glycine
52. Which of the following is a benefit that mycorrhizal fungi confer to many plants ?
- (A) They protect plant roots from desiccation in extremely dry habitats
(B) They fix nitrogen, which is particularly important for plants in nitrogen-limited habitats
(C) They provide access to phosphorus, an essential element that is limited in many kinds of soils
(D) They produce toxin that kill roots of neighbouring plants competing for soil resources

53. The molecular mass of a protein is determined as 150 KD by gel chromatography. When its mass is determined by SDS-PAGE with and without beta-mercaptoethanol, 60 KD, 30 KD and 90 KD are found respectively. Find out the correct statement :
- (A) This is a hetero dimeric protein with disulfide linkage
 - (B) This is a trimeric protein and all subunits are joined with disulfide linkages
 - (C) This is a trimeric protein and two subunits are joined with disulfide linkage
 - (D) All are incorrect statements
54. Gel electrophoresis is used for :
- (A) Isolation of DNA molecule
 - (B) Cutting of DNA into fragments
 - (C) Separation of DNA fragments according to their size
 - (D) Construction of recombinant DNA by joining with cloning vectors
55. Proteomics is the study of :
- (A) Set of proteins
 - (B) Set of proteins in a specific region of the cell
 - (C) Entire set of expressed proteins in a cell
 - (D) None of these
56. From a well-shuffled deck of 52 cards, a card is drawn at random. The probability of getting an ace is :
- (A) $1/13$
 - (B) $1/26$
 - (C) $3/52$
 - (D) $1/52$
57. A list of 5 pulse rates is : 70, 64, 80, 74 and 92. What is the median for this list ?
- (A) 74
 - (B) 76
 - (C) 77
 - (D) 80

58. If the average of a series of values is 10 and their variance is 4, then the coefficient of variation is :
- (A) 40% (B) 20%
- (C) 80% (D) 10%
59. The median of a series of numerical values is :
- (A) A value for which half of the values are higher and half of the values are lower
- (B) The value located exactly midway between the minimum and maximum of the series
- (C) The most commonly encountered values among the series
- (D) A measure of the eccentricity of the series
60. The correlation coefficient computed for two parameters measured in 429 patients is $r = 0.829$. This means that :
- (A) The two parameters are directly correlated, and the link is weak
- (B) The two parameters are inversely correlated, and the link is strong
- (C) The two parameters are directly correlated, and the link is strong
- (D) There are too few cases (under 30) and we do not trust this coefficient's value
61. International Human Genome project was initiated by :
- (A) National Institute of Health (NIH) (B) Celera genomics
- (C) US Department of Energy (DoE) (D) NIH and US DoE
62. Which of the following is not a protein sequence database ?
- (A) PSD (B) EMBL
- (C) PIR (D) SWISS PROT
63. BLAST programme is used in :
- (A) DNA sequencing (B) Amino acid sequencing
- (C) DNA bar coding (D) Bioinformatics
64. Human genome contains about :
- (A) 2 billion base pairs (B) 3 billion base pairs
- (C) 4 billion base pairs (D) 5 billion base pairs

65. Which of the following is a nucleotide sequence database ?
- (A) EMBL (B) SWISS PROT
(C) PROSITE (D) TREMBL
66. Operating System is :
- (A) A collection of hardware components
(B) A collection of input-output devices
(C) A collection of software routines
(D) All of these
67. Which of the following language is more suited to a structured program ?
- (A) PL/1 (B) FORTRAN
(C) BASIC (D) PASCAL
68. The term gigabyte refers to :
- (A) 1024 bytes
(B) 1024 kilobytes
(C) 1024 megabytes
(D) 1024 gigabyte
69. Algorithm and flow chart help us to :
- (A) Know the memory capacity
(B) Identify the base of a number system
(C) Direct the output to a printer
(D) Specify the problem completely and clearly
70. Which statement is valid about computer program ?
- (A) It is understood by a computer
(B) It is understood by programmer
(C) It is understood by user
(D) Both (A) and (B)

SPACE FOR ROUGH WORK