COMMON P.G. ENTRANCE TEST – 2021 (CPET-2021)

Test Booklet No.: 200662

HIGHER EDUCATION DEPARTMENT, GOVT. OF ODISHA

TEST BOOKLET

Subject Code : 12 Entrance Subject : **BIOTECHNOLOGY**

Time Allowed: 90 Minutes *Full Marks : 70*

INSTRUCTIONS TO CANDIDATES

1. **Please do not open this Question Booklet until asked to do so.**
2. Check the completeness of the Question Booklet immediately after opening.
3. Enter your **Hall Ticket No.** on the Test Booklet in the box provided alongside. **Do not** write anything else on the Test Booklet.
4. 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.
5. Each question has four answer options marked (A), (B), (C) & (D).
6. Answers are to be marked on the Answer Sheet, which is provided separately.
7. Choose the most appropriate answer option and darken the oval completely, corresponding to (A), (B), (C) or (D) against the relevant question number.
8. Use only **Blue/Black Ball Point Pen** to darken the oval for answering.
9. Please do not darken more than one oval against any question, as scanner will read such markings as wrong answer.
10. **Each question carries equal marks. There will be no negative marking for wrong answer.**
11. **Electronic items such as calculator, mobile, etc., are not permitted inside the examination hall.**
12. *Don't leave the examination hall until the test is over and permitted by the invigilator.*
13. **The candidate is required to handover the original OMR sheet to the invigilator and take the question booklet along with the candidate's copy of OMR sheet after completion of the test.**
14. Sheet for rough work is appended in the Test Booklet at the end.

1. Which of the following electromagnetic wave has highest wavelength?

(A) X rays (B) UV rays

(C) Infrared rays (D) Microwaves

2. The ray of light passes through _____ part of lens without deviation.

(A) Optical centre (B) Focus

(C) Centre of curvature (D) Pole

3. The number of electrons contained in 1 coulomb of charge is _____

(A) 6.25×10^{17} (B) 6.25×10^{18}

(C) 6.25×10^{19} (D) 1.6×10^{19}

4. Two bodies of masses 4 kg and 5 kg are acted upon by the same force. If the acceleration of light body is 2 m/s^2, the acceleration of the heavier body is _____

(A) 1 m/s^2 (B) 1.2 m/s^2

(C) 1.6 m/s^2 (D) 1.8 m/s^2

5. The dimensional formula of kinetic energy is _____

(A) $ML^{-2}T^{-1}$ (B) ML^2T^{-1}

(C) ML^2T^{-2} (D) M^2LT^{-2}

6. Calculate the pH of 0.02 M NaOH? (log 2 = 0.3010).

(A) 1.7 (B) 8.7

(C) 10.5 (D) 12.3

7. Which quantum number governs the spatial orientation of an atomic orbital?

(A) Magnetic quantum number (B) Spin quantum number

(C) Azimuthal quantum number (D) Principal quantum number

8. Which of the following properties generally decreases along a period?

(A) Ionization energy (B) Valency

(C) Electron affinity (D) Metallic character

9. What type of hybridization is exhibited by BCl_3 and PCl_5 respectively?

(A) sp^3, sp^5 (B) sp^2, sp^3d

(C) sp^2, sp^3 (D) sp^3d, sp^2

10. The half-life of the decomposition of a compound is 20 min. When the initial concentration of compound is doubled, the half-life period reduces to 10 min. Find the order of reaction?

(A) Zero (B) First

(C) Second (D) Third

11. The binary equivalent of the decimal number 72 is _____

(A) 101000 (B) 100100

(C) 101000 (D) 1001000

12. Find out the value of 'x', if $\log_5 (x-7) = 1$.

(A) 5 (B) 7

(C) 12 (D) 16

13. The 1st January of 2021 is Friday. What date 1st January 2023 will fall?

(A) Sunday (B) Tuesday

(C) Thursday (D) Saturday

14. A train is moving at a speed of 132 km/hr. If the length of the train is 110 meters, how long will it take to cross a railway platform of 165 meters long?

(A) 7 sec (B) 7.5 sec

(C) 8 sec (D) 8.5 sec

15. The sum of three numbers is 98. If the ratio of the first and second is 2:3 and that of the second to the third is 5:8. Find out the second number?

(A) 58 (B) 48

(C) 30 (D) 20

16. Which one of the following statement is correct?

(A) More is the degree of unsaturation in fat, more is the safonification number.

(B) Shorter the average chain length of fatty acids, higher is safonification number.

(C) Safonification number reveals the quantity of free fatty acid present in a fat.

(D) Safonification number is a measure of the number of –OH groups in the fat.

17. Which of the following glycosidic linkage is found in cellulose?

(A) Glucose ($\alpha 1 \rightarrow 4$) Glucose (B) Glucose ($\alpha 1 \rightarrow 6$) Glucose

(C) Glucose ($\beta 1 \rightarrow 4$) Glucose (D) Glucose ($\beta 1 \rightarrow 6$) Glucose

18. Which of the followings are known as helix breakers?

(A) Threonine (B) Proline and glycine

(C) Valine (D) Isoleucine and leucine

19. Which step of the TCA cycle is involved in the reduction of FAD?

(A) Isocitrate to Oxaloacetate (B) Succinyl CoA to Succinate

(C) Fumarate to Malate (D) Succinate to Fumarate

20. The non-competitive inhibitor of an enzyme catalyzed reaction .....

(A) Increases Km and increases Vmax

(B) Increases Km and reduces Vmax

(C) Reduces Km and increases Vmax

(D) Reduces Km and reduces Vmax

21. The coenzymes FMN and FAD are derived from _____ vitamin.

(A) Vitamin C (B) Vitamin B1

(C) Vitamin B2 (D) Vitain B6

22. Methylated purines and pyrimidines are characteristically present in _____ .

(A) mRNA (B) hnRNA

(C) rRNA (D) tRNA

23. In the conversion of lactic acid to glucose, three reactions of glycolyic pathway are circumvented. Which of the following enzymes do not involved in the process?

(A) Phosphoenol pyruvate carboxykinase (B) Pyruvate carboxylase

(C) Pyruvate kinase (D) Glucose-6 phosphatase

24. The decarboxylation reaction in HMP shunt is catalyzed by _____ .

(A) 6-phosphogluconate decarboxylase (B) Glucolactone hydrolase

(C) 6-phosphogluconate dehydrogenase (D) Transaldolase

25. The common precursor molecule that involves in the biosynthesis of triacylglycerol and phospholipids is _____

(A) Glycerol 3-phosphate (B) 1-acylglycerol 3-phosphate

(C) Dihydroxyacetone phosphate (D) 1,2-diacylglycerol phosphate

26. Which one of the following compound does not act as second messenger during signaling process?

(A) Triacylglycerol (B) cAMP

(C) Diacylglycerol (D) cGMP

27. Which of the following cases, the first base of the anticodon pairs with three codons?.

(A) When the 1st base of the anticodon is A or C.

(B) When the 1st base of the anticodon is A or G.

(C) When the 1st base of the anticodon is G or U.

(D) When the 1st base of the anticodon is Inosine.

28. Which of the following is not the component of rRNA present in eukaryotes?

(A) 5S rRNA (B) 16S rRNA

(C) 18S rRNA (D) 28S rRNA

29. Which of the following transcription termination technique involves RNA dependent ATPase activity?

(A) Rho dependent (B) Intercalating agents

(C) Rho independent (D) Rifampicin

30. Which segments of the attenuator together form repression loop in trytophan operon?

(A) Segment 1-2 (B) Segment 2-3

(C) Segment 2-4 (D) Segment 1-4

31. A bacterial population increases from 10^3 to 10^9 cells in 10 hours. Calculate the number of generations per hour?

(A) 20 (B) 10

(C) 4 (D) 2

32. Which of the following antibiotics inhibit protein synthesis by binding with the 50S subunit of ribosome?

(A) Chloramphenicol (B) Streptomycin

(C) Tetracyclin (D) Penicillin

33. Which of the following statement is INCORRECT for *Archaebacteria*?

(A) The Cell wall is not made up of peptidoglycan

(B) The cell membrane have branched chain hydrocarbons

(C) The cell wall has both D- and L- form of amino acids

(D) The first amino acid to initiate polypeptide chain is methionine

34. Which of the following viruse replicate in the cytoplasm?

(A) SV40 (B) Adenovirus

(C) Herpes simplex virus (D) Vaccinia virus

35. Match the columns:

Column-1	Column-2
i. *Corynebacterium diphtheriae*	a. Blocks release of acetylcholine
ii. *Clostridium tatani*	b. Binds to class-II MHC molecule
iii. *Clostridium botulinum*	c. Inactivates EF-2 by ADP ribosylation
iv. *Staphylococcus aureus*	d. Blocks release of inhibitory neurotransmitter glycine

(A) i-c, ii-d, iii-a, iv-b (B) i-d, ii-c, iii-a, iv-b

(C) i-b, ii-c, iii-a, iv-d (D) i-c, ii-b, iii-a, iv-d

36. People with Klinefelter syndrome have 47 chromosomes including three sex chromosomes (XXY). What is the term to describe the aberration that occurs dring meiosis that results in abnormal chromosome number?

(A) Crossing over

(B) Non-disjunction

(C) Pairing of homologous chromosome

(D) Independent assortment

37. If individuals of genotype AaBbCc are intercrossed, how many different F2 phenotypes can appear assuming complete co-dominance at all loci?

(A) 8 (B) 9

(C) 27 (D) 64

38. The deviation from the Hardy-Weinberg assumption of infinitely large population size results in _____

(A) Genetic lethal (B) Heterozygote advantage

(C) Consangunity (D) Genetic drift

39. Down's syndrome is caused by presence of a third copy of chromosome 21 associated with chromosome 21 pair. The genetic condition is known as trisomy 21, which is caused by _____

(A) Frame-shift mutation (B) Chromosome nondisjunction

(B) Fragile X syndrome (D) Chromosome translocation

40. A plant of genotype AB/ab is test crossed with ab/ab. If the two loci are 10 map units apart, what proportion of progeny will be AB/ab?

(A) 5% (B) 10%

(C) 20% (D) 45%

41. Which of the following is not a function of rough endoplasmic reticuum?

(A) N-linked glycosylation of proteins (B) Folding of polypeptide chains

(C) O-linked glycosylation of proteins (D) Specific proteolytic cleavage

42. Which of the following is the marker enzyme for Golgi apparatus?

(A) Acetyl-CoA synthetase (B) Galactosyl transferase

(C) Pyruvate kinase (D) Cytochrome oxidase

43. If the number of bivalents are 10 in Prophase-I, what is the number of chromosomes during Anaphase-II?

(A) 10 (B) 20

(C) 30 (D) 40

44. Cyclin-dependent kinase activity increases steadily during G2 phase due to _____

(A) phosphorylation of mitotic cyclins by Cdks

(B) transient increase in the cytosolic GTP concentration

(C) activation of mitotic Cdk-cyclins through the phosphatase activity

(D) phosphorylation of Cdks located inside catalytic site of Cdk-cyclin complex

45. Which of the following is associated with the hyperpolarization of cell membrane?

(A) Activation of voltage-gated K^+ channels

(B) Activation of the Na^+ leaky channel

(C) Activation of Ca^{2+} voltage gated channel

(D) Activation of voltage-gated Na^+ channel

46. Which of the following disease is not an autoimmune disease?

(A) Rheumatoid arthritis (B) Lupus erythematosus

(C) Bovine spongiform encephalitis (D) Grave's disease

47. Which of the following is not true for T-cell receptor (TCR)?

(A) TCRs are not antigen specific.

(B) TCR is membrane bound.

(C) TCR does not appear in a soluble form as B-cell receptor does.

(D) TCRs are specific for antigen combined with molecules encoded by MHC.

48. Which of the following statements about complements are correct?

P. Classical pathway is initiated by IgM and certain IgG subclasses of antibodies.

Q. Alternative and lectin pathways are antibody independent.

R. The complement system mediates opsonization of bacteria.

S. Nucleated cells are more resistant to complement mediated lysis than RBCs

(A) P and Q (B) Q and S

(C) P, Q and R (D) P, Q, R and S

49. Choose the mismatch.

(A) IgG: the most abundant type in serum

(B) IgA: Major antibody in secretions such as saliva, tears and breast milk

(C) IgD: Protects against pathogens invading through gut mucosa

(D) IgE: least abundant and play important role in hypersisitivity

50. Which statements are correct about the cell mediated immune response?

P. It is dependent upon the humoral response.

Q. It is usually used to respond to virus-infected cells.

R. It involves direct recognition of the antigen by killer T-cells.

S. It requires that the antigen be presented to killer T-cells by an MHC protein.

(A) P and S (B) Q and S

(C) P, Q and S (D) P, Q, R and S

51. Which of the following rule is not considered to design primers for PCR?

(A) Tm of both primers

(B) Length of primers

(C) A+G content of both the primers

(D) Complementarity between the primers

52. IgG has four chains. The purified monoclonal IgG was subjected to electrophoresis. The number of bands visible by (i) reducing SDS-PAGE, (ii) isoelectric focusing and (iii) native PAGE are _____ respectively.

(A) i-2, ii-1 and iii-1 (B) i-2, ii-2 and iii-2

(C) i-4, ii-1 and iii-1 (D) i-4, ii-2 and iii-2

53. The absorbance of a solution X of concentration 0.005 mg/ml is found to be 0.49 at 540 nm using 1 cm cuvette. What is the absorbance, if the solution X is diluted twice and the measurement is taken in 5 cm cuvette?

(A) 0.049 (B) 0.098

(C) 0.245 (D) 1.225

54. Which chromatographic technique is not suited for protein separation, because the proteins get denatured by it?

(A) Ion exchange chromatography (B) Affinity chromatography

(C) Reverse phase chromatography (D) Size exclusion chromatography

55. Which of the microscopy techniques relies on the specimen interfering with the wavelength of light to produce a high contrast image without the need of dyes or any damage to the sample?

(A) Electron microscopy (B) Phase contrast microscopy

(C) Bright field light microscopy (D) Fluorescence microscopy

56. Mean haemoglobin level of 100 persons was estimated to be 100 gm% with standard deviation of 1 gm%. Calculate the standard error?

(A) 0.1 gm% (B) 1 gm%

(C) 10 gm% (D) 100 gm%

57. The mean weight of 100 children was 12 kg with standard deviation of 3 kg. Calculate the percent coefficient of variation?

(A) 25% (B) 35%

(C) 45% (D) 60%

58. Poisson distribution is applied for _____.

(A) Regular random variable (B) Discrete random variable

(C) Irregular random variable (D) Constant time function

59. Calculate the variance of the given dataset: 4, 7, 6, 3, 7 and 3?

(A) 2 (B) 4

(C) 6 (D) 8

60. A dice is tossed 5 times. What is the probability of getting exactly 2 Four?

(A) 0.028 (B) 0.161

(C) 0.167 (D) 0.333

61. To code 50 amino acids in a polypeptide chain, what will be the minimum number of nucleotides in its cistron?

(A) 50 (B) 153

(C) 300 (D) 306

62. Choose the mismatch.

(A) Phagemid	Part of M13 genome with plasmid DNA
(B) P1-derived artificial chromosome	Combined features of P1 vector & BACs
(C) Shuttle vector	Yeast episomal plasmids
(D) Ti plasmid	*Agrobacterium rhizogenes*

63. A 200 µl of PCR mixture has 100 template DNA molecules and the reaction was performed for 10 cycles. How many molecules of amplicons will be generated?

(A) 1.024×10^4 (B) 1.024×10^5

(C) 2.024×10^4 (D) 2.024×10^5

64. Which of the following role does opines play in Crown gall disease?

(A) Source of carbon, nitrogen and energy for *Agrobacterium*

(B) Transfer of T-DNA to plant cells

(C) Attachment of *Agrobacterium* to the plants

(D) Induction of expression of vir genes

65. Genetically engineered male sterile crop plants may be produced by inserting _____

(A) BT toxin gene (B) barnase gene

(C) lectin gene (D) chitinase gene

66. The genes required to transfer rice plant into 'Golden rice' were obtained from _____

(A) Carrot and Cotton (B) Daffodil and *E.coli* bacterium

(C) Sunflower and Cotton (D) Daffodil and *Erwinia* bacterium

67. Match the columns:

Column-1	Column-2
(i) Cyanogen bromide	(a) Carboxyl side of aromatic amino acids
(ii) Trypsin	(b) Asparagine-glycine bonds
(iii) Chymotrypsin	(c) Carboxyl side of lysine and arginine
(iv) Hydroxylamine	(d) Carboxyl side of methonine
(v) 2-Nitro-5-thiocyanobenzoate	(e) Amino side of cysteine

(A) i-c, ii-d, iii-a, iv-e, v-b (B) i-d, ii-c, iii-a, iv-b, v-e

(C) i-b, ii-c, iii-a, iv-e, v-d (D) i-c, ii-b, iii-a, iv-d, v-e

68. The protein binding regions of DNA are identified by _____ .

(A) DNA fingerprinting (B) Southern blotting

(C) DNA foot printing (D) Northern blotting

69. Which of the following reporter gene expression does not require addition of specific substrate for detection?

(A) Luciferase (B) β-Glucuronidase

(C) Green fluorescent protein (D) β-Glucosidase

70. Choose the mismatch.

(A) Jacob's syndrome	44 + XYY
(B) Turner's syndrome	44 + XO
(C) Huntington's chorea	44 + XXXY
(D) Down's syndrome	2N + 1

****