

B-8

ENTRANCE EXAMINATIONS - 2022

Ph.D. Plant Sciences & Ph.D. Microbiology

Time: 2 hours

Maximum marks: 70

Hall Ticket No.:

INSTRUCTIONS

Read the following instructions carefully before answering the questions:

1. Enter your Hall Ticket number both on the top of this page and on the OMR answer sheet.
2. This booklet contains seventy (35 each in Part-A and Part-B) Multiple Choice Questions (MCQs) printed on 15 pages.
3. Each question carries one mark, and there is no negative marking.
4. The marks obtained in Part-A will be used for resolving the tie cases.
5. Please ensure that this booklet contains the requisite number of pages and that no page is torn or mutilated.
6. Answers should be marked on the OMR answer sheet, which is provided separately.
7. After the test, hand over the OMR answer sheet to the invigilator.
8. No additional sheets will be provided. The last page of this booklet shall be used for rough work.
9. Use of a calculator or mobile phone is not permitted.

PART-A

1. In the CRISPR-Cas9 system, binding and cleavage of DNA by Cas9:gRNA require recognition of a short trinucleotide protospacer adjacent motif (PAM) in the target genome. The correct sequence of this PAM (5'-3') is _____.

A) NAA	B) NTT
C) NGG	D) NCC

2. The formation of extreme phenotypes observed in segregating hybrid populations compared to the phenotypes observed in parental lines is known as _____.

A) Transposable segregants	B) Transgressive segregants
C) Reciprocal segregants	D) Recurrent segregants

3. If 0.1 mL of a culture from a 10^{-6} dilution yielded 38 colonies, how many bacteria (cfu) were there per mL in the original sample?

A) 3.8×10^6	B) 3.8×10^7
C) 3.8×10^8	D) 3.8×10^9

4. Which of the following statement(s) is/are correct about competitive inhibition?
 - a. In equilibrium, the degree of inhibition depends on how long the inhibitor was in contact with the enzyme
 - b. The inhibitor reacts with the substrate under the formation of a substrate inhibitor complex
 - c. Competitive inhibition requires that the inhibitor binds to the substrate binding site
 - d. V_{max} may be reached if the concentration of free substrate is high enough

A) a and b	B) b alone
C) c and d	D) d alone

5. Two linked genes are separated by a distance such that precisely 10% of the cells undergoing meiosis have one crossover (chiasma) between the genes, and 90% have no crossover. What is the recombination frequency between the genes?

A) 5%	B) 10%
C) 15%	D) 20%

6. A plant species nearing its extinction due to virus infection has been given for tissue culture and micropropagation. Scientists choose the below four explants for culturing:

a. Meristem	b. Shoot tip	c. Leaf disc	d. Root tip
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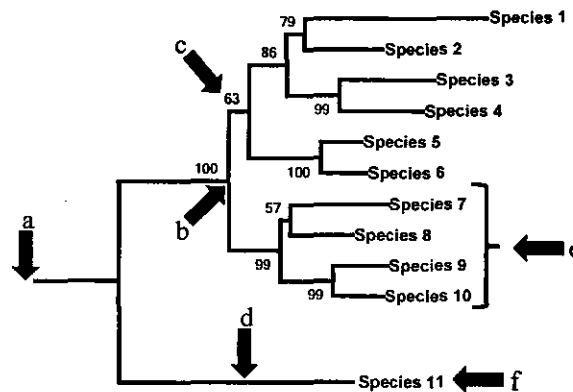
Which explants have a higher probability of producing virus-free plants?

- | | |
|------------|------------|
| A) a and b | B) a and c |
| C) b and c | D) b and d |

7. Conjugation can be used to map bacterial genes by mixing ___ cells that differ in genotype and interrupting conjugation at regular intervals. The time required for individual genes to be transferred from one bacterium to another indicates the relative positions of the genes on the genome.

A) $F^+ \times F^-$ B) $Hfr^- \times F^-$ C) $F' \times F^-$ D) $F' \times Hfr$

8. In the given phylogenetic tree, identify the parts labelled as 'a' to 'f.'



- A) a - root; b - bootstrap; c - node; d - taxon; e - branch; f - clade
 B) a - node; b - clade; c - bootstrap; d - branch; e - taxon; f - root
 C) a - root; b - node; c - bootstrap; d - branch; e - clade; f - taxon
 D) a - branch; b - root; c - node; d - taxon; e - bootstrap; f - clade
9. A researcher isolated a protein that binds to DNA upstream of the promoter sequence of the *sh* gene. If this protein is a positive regulator, then which one of the following statements would be true?
- A) Loss-of-function mutation in the gene encoding the DNA-binding protein would result in an altered gene product lacking the function of the wild-type gene
 B) Loss-of-function mutation in the gene encoding the DNA-binding protein would produce an altered gene protein possessing a new function
 C) Loss-of-function mutations in the gene encoding the DNA-binding protein would cause constitutive expression
 D) Loss-of-function mutation in the gene encoding the DNA-binding protein would result in no expression
10. In tRNA, Ψ (Psi) -arm is named for the presence of ____.
- A) Amino-pseudopurine B) Pyrimidinediol
 C) Uracil-pseudouridine D) Dioxypyrimidine
11. A DNA stretch of 25.68 Kb is equivalent to ____ Mb.
- A) 2.568 B) 0.2568
 C) 0.02568 D) 0.002568

12. Consider the following statements on the common features between phase-contrast and dark-field microscopes:

- Both increase contrast between specimen and background without staining
- Both make specimens fluoresce on a dark background
- Both make the specimen appear dark on a bright background without staining
- Both make specimens visible that refract light away from the objective

Which of the above is/are true?

- | | |
|------------|------------|
| A) a alone | B) a and b |
| C) c alone | D) c and d |

13. What does the asterisk (*), colon (:), and period (.) indicate in the multiple sequence alignment of three protein sequences given below?

```

sp|P69905|HBA_HUMAN      MVLSPADKTNVKAANGKVGAGHAGEYGAELERMFLSFPTTKTYFPHFDLSHGSAQVKGHG 60
sp|P01942|HBA_MOUSE     MVLSGEDKSNIAAANGKIGGHGAEYGAELERMFAFPTTKTYFPHFDVSHGSAQVKGHG 60
sp|P13786|HBAZ_CAPHI    MSLTRTERTIILSLWSKISTQADVIGTETLERLFSCYPQAKTYFPHFDLHSGSAQLRAHG 60
* *:  ::  : : *.*: . . *:*:*:* * .* :*****: *****:..**

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- Asterisk – conserved amino acids; colon – conserved substitution; period – semi-conserved substitution
- Asterisk – non-conserved amino acids; colon – conserved substitution; period – semi-conserved substitution
- Asterisk – conserved amino acids; colon – semi-conserved substitution; period – conserved substitution
- Asterisk – non-conserved amino acids; colon – semi-conserved substitution; period – conserved substitution

14. What does the CT value (cutoff threshold) in quantitative real-time PCR imply?

- Higher the value, higher the transcript number
- Lower the value, higher the transcript number
- Lower the value, lower the transcript number
- None of the above

15. Gregor Mendel's experiments with garden pea did not find any apparent linkage between any of the seven traits he studied. Identify the correct statement(s) that could explain the absence of linkage for the seven genes he studied.

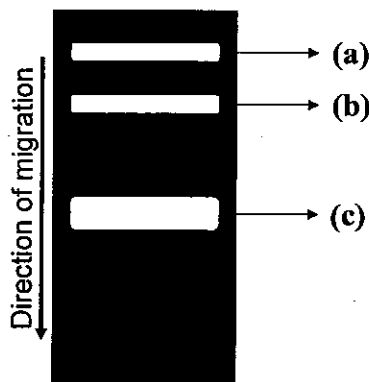
- The seven genes studied by him are located on seven different chromosomes
- Two different genes that were present on the same chromosome were so distantly located that no linkage was usually detected
- He chose one gene from each chromosome while making crosses
- He might not have made the appropriate cross to obtain both genes segregating simultaneously

- | | |
|------------|------------|
| A) a alone | B) a and c |
| C) b alone | D) b and d |

16. Which of the following elements affect photosynthetic and mitochondrial transports in plants?

- A) Cu, Mn, and Fe B) Co, Mn, and Fe
 C) Cu, Mg, and Cl D) Zn, Cu, and Fe

17. A plasmid of approximately 10 kb size isolated from *E. coli* DH5 α was resolved on an agarose gel. The sample produced three distinct bands on the gel, as shown below.



Identify (a), (b) and (c).

- A) (a) linear, (b) nicked, (c) supercoiled
 B) (a) supercoiled, (b) linear, (c) nicked
 C) (a) nicked, (b) linear, (c) supercoiled
 D) (a) supercoiled, (b) nicked, (c) linear

18. A solution has a pH of 3.5. Calculate its pOH.

- A) 13.5 B) 12.5
 C) 11.5 D) 10.5

19. Match the PCR types (A) with their correct description (B)

A

B

- a. Touchdown PCR – i. Synthesis of DNA using RNA as template
 b. Nested PCR – ii. Determines the transcript abundance in the sample
 c. RT-PCR – iii. Annealing temperature is gradually lowered in later cycles
 d. Colony PCR – iv. Two sets of primers are used in two successive reactions
 e. qRT-PCR – v. Screen the bacterial cells directly to detect the DNA

- A) a-ii; b-iv; c-v; d-iii; e-i
 C) a-v; b-iii; c-i; d-iv; e-ii

- B) a-iii; b-iv; c-i; d-v; e-ii
 D) a-iv; b-i; c-ii; d-iii; e-v

20. The following statements are on phase contrast microscopy.
- Phase contrast microscopy is based on the principle that cells, which do not differ in refractive index from their surroundings, do not bend some of the light rays that pass through them
 - Cells with no refractive index can be viewed under a phase contrast microscope
 - Phase contrast microscopy is based on the principle that cells differ in refractive index from their surroundings and hence bend some of the light rays that pass through them
 - In phase contrast microscopy, the lighting system has been modified to reach the specimen from the sides only

Identify the correct statement(s).

- | | |
|------------|------------|
| A) a alone | B) a and b |
| C) c alone | D) c and d |

21. Consider the following reactions that occur during glycolysis.

- Conversion of glucose 6-phosphate to fructose 6-phosphate
- Conversion of glyceraldehyde 3-phosphate to 1,3-bisphosphoglycerate
- Conversion of 2-phosphoglycerate to 2-phosphoenolpyruvate
- Conversion of fructose 6-phosphate to fructose 1,6-bisphosphate

Which of the reaction(s) is/are not reversible?

- | | |
|------------|------------|
| A) a and c | B) b alone |
| C) b and d | D) d alone |

22. The correct grading of the below taxa in the descending order of Linnaean hierarchy is _.

(i) Class; (ii) Kingdom; (iii) Phylum; (iv) Order; (v) Genus; (vi) Family; (vii) Species

- | | |
|---|---|
| A) (ii), (iii), (iv), (vi), (i), (v), (vii) | B) (vii), (v), (i), (vi), (iv), (iii), (ii) |
| C) (ii), (iii), (i), (iv), (vi), (v), (vii) | D) (vii), (v), (vi), (iv), (i), (iii), (ii) |

23. Dr. Strange tried to clone two genes, 'A' and 'B,' independently into a plasmid for overexpression in *E. coli* and protein purification. All his attempts to clone 'A' were unsuccessful, whereas gene 'B' was cloned easily. When he inserted 'A' into the same plasmid containing 'B', the cloning was successful, and overexpression was achieved. Dr. Strange proposed the below statements to explain his result:

- The protein encoded by 'A' gene is not lethal to *E. coli*.
- 'A' has introns that prevent its expression in *E. coli*.
- The expression of 'A' gene is lethal to *E. coli*.
- The protein encoded by 'B' inhibits the activity of 'A' protein.

Which statements are correct to explain the observations?

- | | |
|------------|----------------|
| A) a and b | B) b, c, and d |
| C) a and d | D) a, c, and d |

24. Match the mutagens (A) with the type of mutation they induce (B).

A	B
a. 5-bromouracil	– i. intercalating and buckling DNA
b. Ethyl ethane sulfonate	– ii. purine analogue
c. Proflavine	– iii. conversion of adenine to hypoxanthine
d. 2-aminopurine	– iv. removal of the purine ring
e. nitrous acid	– v. pyrimidine analogue

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

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

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

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

25. Consider the below statements differentiating the *T₄* DNA ligase from *E. coli* DNA ligase:

- T₄* ligase ligates blunt ends, while *E. coli* ligase ligates cohesive ends
- T₄* ligase uses NAD as a cofactor, while *E. coli* ligase uses ATP
- T₄* ligase is encoded by gene 30, while *E. coli* ligase is encoded by *lig* gene
- T₄* ligase works at 37°C, while *E. coli* ligase works at 16°C

Which of the statements are correct?

A) a and b

B) b and c

C) a and c

D) b and d

26. Consider the following statements about designing primers for PCR.

- The orientation of the primer sequence should be 3' to 5' as it enables the synthesis in 5' to 3' direction
- The forward and reverse primers should have similar melting temperatures as it enhances the specificity
- Primers with melting temperatures above 65°C have a tendency for secondary annealing
- The GC content of primer should be 20% or less as it enables easy melting and annealing

Which of the statements are correct?

A) a and b

B) b and c

C) b, c, and d

D) c and d

27. *Taq* polymerase incorporates which residue at the 3' end?

A) Adenine

B) Guanine

C) Thymine

D) Cytosine

28. Though DNA and RNA are nucleic acids, isolation of RNA in the laboratory requires extreme precautions and pre-preparations than isolating DNA. This could be because:

- DNA content of a cell is more, but RNA will be present in lesser concentrations, so care should be taken to avoid loss
- RNA is smaller in size than DNA, so it requires stringent procedures to capture those smaller molecules
- RNA is unstable and prone to degradation, but DNA is relatively stable, eases DNA isolation
- DNA is bound to proteins that safeguard the molecule, but RNA is naked, making separating difficult

- A) a alone is correct B) a and b are correct
C) c alone is correct D) c and d are correct

29. The molar extinction coefficient is expressed as ____.

- A) $L \text{ mol}^{-1} \text{cm}^{-1}$ B) $\text{cm}^{-1} \text{mg mL}^{-1}$
C) $\text{mol}^{-1} \text{mm}$ D) mol cm mL^{-1}

30. *Asparagus officinalis* L. is a dioecious plant species that have the XX-XY system of sex determination. The males (XY) are more valuable commercially as they produce spears with lower fibre content. Androgenetic haploids produced through microspore culture will result in ____.

- A) Homozygous females (XX) and Homozygous males (XY)
B) Homozygous supermales (YY) and Homozygous males (XY)
C) Homozygous females (XX) and Homozygous supermales (YY)
D) None of the above

31. Which technique cannot be used to separate, detect, or visualize DNA?

- A) Western blotting B) PAGE
C) Fluorescence microscopy D) DHPLC

32. Which of the following statements about protein structure is/are incorrect?

- Hydrophobic amino acid side chains are buried inside globular proteins
- Beta-sheets are stabilized by hydrogen bonds between parallel or antiparallel strands
- Amino acids in coils have an undefined, random position
- Protein secondary and tertiary structure can be changed by high salt concentration

- A) a and b B) a only
C) c and d D) c only

33. Which of the following dye is used for negative staining of bacteria?

- A) Methylene blue B) Carbol fuchsin
C) Nigrosin D) Crystal violet

34. Before measuring the DNA concentration using NanoDrop, heating the sample to 55°C and gently vortexing before the measurement is recommended. This is to ____.

- A) Precipitate the impurities in the sample that interfere with the measurement
- B) Circumvent the effect of sample non-homogeneity to ensure accuracy
- C) Achieve better absorbance by melting the DNA for reproducibility
- D) To thaw the DNA sample stored at lower temperatures and mix them properly

35. Consider the following reactions:

- a. $\text{Ethanol} + \text{NAD}^+ \rightarrow \text{acetaldehyde} + \text{NADH} + \text{H}^+$
- b. $\text{glucose} + \text{ATP} \rightarrow \text{glucose-6-phosphate} + \text{ADP}$
- c. $\text{glucose-6-phosphate} \leftrightarrow \text{fructose-6-phosphate}$

Identify the correct enzyme classes that catalyze these processes.

- A) a – oxidoreductase; b – transferase; c – isomerase
- B) a – dehydrogenase; b – phosphatase; c – isomerase
- C) a – hydrolase; b – transferase; c – isomerase
- D) a – kinase; b – phosphatase; c – isomerase

PART-B

36. Which is the first intranasal Covid vaccine approved for emergency use in India?

- A) iNCOVACC
- B) iNasoVAX
- C) iCOVI-VAC
- D) iAdCOVID

37. Which of the following is/are not valid for gymnosperms?

- a. They possess vessels in their xylem
- b. They are mostly unisexual
- c. Seeds are not formed inside a fruit
- d. Their endosperm is haploid in nature

- A) a alone
- B) a and b
- C) c alone
- D) c and d

38. Which of the following is the recent extinction event that happened in the history of Earth?

- A) Ordovician-Silurian extinction
- B) Cretaceous-Tertiary extinction
- C) Devonian extinction
- D) Triassic-Jurassic extinction

39. Which pathogen causes wilt disease in different cultivated plant species like tomato, potato, etc.?

- A) *Ralstonia solanacearum*
- B) *Bacillus subtilis*
- C) *Burkholderia cepacia*
- D) *Pseudomonas maltophilia*

40. In February 2021, the International Committee on Systematics of Prokaryotes revised the phyla names listed under the International Code of Nomenclature of Prokaryotes. Match the below original names of phyla (A) with their corrected ones (B).

A	B
a. Firmicutes	i. Bacteroidota
b. Proteobacteria	ii. Actinomycetota
c. Actinobacteria	iii. Bacillota
d. Bacteroidetes	iv. Pseudomonadota

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

41. Match the complement of sex chromosomes (A) to the sex-type or effect observed in *Drosophila melanogaster* (B).

A	B
a. XXX	i. Sterile male
b. XXY	ii. Male
c. XYY	iii. Female
d. XO	iv. Death

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

42. Which of the following is an SNP genotyping method?

A) OLA	B) UBER
C) MERU	D) AUTO

43. When a dominant allele at one locus can mask the expression of both alleles at the second locus, it is known as ____.

A) Duplicate dominant epistasis (15:1 ratio)
B) Duplicate recessive epistasis (9:7 ratio)
C) Recessive epistasis (9:3:4 ratio)
D) Dominant and recessive epistasis (13:3 ratio)

44. A fungal mycelium is typically composed of radially extending hyphal filaments interconnected by bridges created through ____.

A) Anastomoses	B) Hyperstomosis
C) Syncromotosis	D) Epistemosis

45. The mollicute, devoid of cell wall but found mainly restricted to the phloem cells in a plant, is called ____.

A) Neuroplasma	B) Seroplasma
C) Phytoplasma	D) Protoplasma

46. Identify the incorrect matches between A and B.

A	B
a. <i>Mycoplasma genitalium</i>	– i. Smallest known cellular genome
b. <i>Streptomyces coelicolor</i>	– ii. Antibiotic producer
c. <i>Sulfolobus solfataricus</i>	– iii. Grows at high temperature and alkaline pH
d. <i>Pyrococcus abyssi</i>	– iv. Grows at low temperatures

A) a. – ii.

B) c. – iv.

C) b. – iii.

D) a. – iv.

47. Which mode of speciation refers to a large population of a species being separated due to the formation of a physical barrier such as a mountain or a river, leading to reproductive isolation and blockage of gene flow, eventually leading to the formation of two new species?

A) Parapatric

B) Allopatric

C) Allelopatric

D) Myxopatric

48. The average of the squared differences from the mean of the samples drawn from a population is called ____.

A) Variance

B) Mean average difference

C) Average variation

D) Coefficient of variation

49. Which of the following Archaeal species causes periodontitis in humans?

A) *Methanobrevibacter oralis*

B) *Periodontitis gingivalis*

C) *Methanococcus oralis*

D) *Methanoplasmata periodontitia*

50. The specificity of a restriction enzyme is affected by the concentration of buffer used. This phenomenon is termed ____.

A) Star activity

B) Specificity elevation

C) Concentration gradient effect

D) Buffer effect

51. Gas production in a bacterial culture can be monitored by suspending a Durham tube in the carbohydrate-containing broth to trap the gas bubbles. If gas is produced, it is typically CO₂ or ____.

A) O₂

B) H₂

C) NH₃

D) CH₄

52. Which of the following is not a function of the 5' cap and 3' poly-A tail of a mature eukaryotic mRNA molecule?

A) Assisting in ribosome binding during translation

B) Protecting mRNA from degradation

C) Enabling splicing by a sequence-specific mechanism

D) Aiding the export of the mRNA to the cytoplasm

53. Consider the following statements on genetic drift:

- a. It is significant in small populations
- b. It can cause allele frequencies to change in a pre-directed way
- c. It can lead to a loss of genetic variation within populations
- d. It can cause harmful alleles to become fixed

Which of the above statements are correct?

- A) a and b
- B) b, c, and d
- C) a and c
- D) a, c, and d

54. Match the type of mutation (A) with its correct definition (B).

- | A | | B |
|---------------------|---|---|
| a. Transition | - | i. Changes the wild-type phenotype to a mutant phenotype |
| b. Forward mutation | - | ii. Base substitution in which a purine replaces a purine, or a pyrimidine replaces a pyrimidine |
| c. Polar mutation | - | iii. Base substitution in which a purine replaces a pyrimidine, or a pyrimidine replaces a purine |
| d. In-frame InDel | - | iv. Mutation that affects the expression of downstream genes or operons |
| e. Transversion | - | v. Deletion or insertion of a multiple of three nucleotides that does not alter the reading frame |

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

55. Which of the following bacterium has only photosystem I and performs anoxygenic photosynthesis alone?

- A) *Synechococcus*
- B) *Paracoccus*
- C) *Marichromatium*
- D) *Prochlorococcus*

56. Radiation resistance is widely observed in ____.

- A) *Proteobacteria*
- B) *Firmicutes*
- C) *Deinococcus*
- D) *Planctomycetes*

57. ____ is a climate response that reinforces the vulnerability, exposure, and risk to climate change.

- A) Maladaptation
- B) Misadaptation
- C) Counteradaptation
- D) Preadaptation

58. Match the disease symptom (A) with the causal organism (B).

- | A | B |
|------------------------------|---------------------------------------|
| a. Pustules with uredospores | – i. <i>Xanthomonas campestris</i> |
| b. Cankerous outgrowth | – ii. <i>Synchytrium endobioticum</i> |
| c. Grey mold rot | – iii. <i>Puccinia graminis</i> |
| d. Black wart | – iv. <i>Botrytis cinerea</i> |

- | | |
|---------------------------|---------------------------|
| A) a-iv, b-iii, c-i, d-ii | B) a-iii, b-i, c-iv, d-ii |
| C) a-iii, b-iv, c-ii, d-i | D) a-ii, b-i, c-iii, d-iv |

59. Recently, cases of black fungus (mucormycosis) infection in people with COVID-19 have been reported worldwide. The following statements provide further details on mucormycosis.

- Mucormycosis is caused by the Mucoraceae fungus
- Rhizopus*, *Mucor*, and *Absidia* species are the most common pathogens in this family
- Mucormycosis causing fungus belongs to the order Mucorales and Class Zygomycetes
- Mucormycosis is an angioinvasive disease, also known as zygomycosis

Identify the incorrect statement(s).

- | | |
|------------------|------------------|
| A) a and c | B) b and d |
| C) All are false | D) None is false |

60. The present monkeypox disease outbreak is an additional significant threat in the world that has just started to recover from the COVID-19 pandemic. Which of the following statement(s) is/are not true about monkeypox?

- Human monkeypox virus (MPXV) is a double-stranded RNA virus
- MPXV belongs to the Orthopoxvirus genus of the family Poxviridae
- Clinical presentation of MPXV includes symptoms and lesions similar to smallpox
- Non-replicating smallpox vaccines may provide cross-protection for individuals at high risk of MPXV infection

- | | |
|------------|------------|
| A) a alone | B) a and d |
| C) b alone | D) b and c |

61. How does urea act as a strong denaturant of proteins?

- By perturbing all the electrostatic interactions in the protein
- By perturbing all the hydrophobic interactions in the protein
- By perturbing hydrophobic interactions and also binds to peptide groups
- By perturbing hydrophobic interactions and also binds to nonpolar sidechains

62. Which of the following techniques need to be used to show that a protein is homotetramer with a subunit of molecular weight 25 kDa?
- Affinity chromatography and ion-exchange chromatography
 - Isoelectric focusing and SDS-PAGE
 - Gel filtration and native PAGE
 - SDS-PAGE and gel filtration
63. The amount of phenotypic variation in a population that is attributable to individual genetic differences is known as ____.
- Heritability
 - Differential selection
 - Genetic advance
 - Heterosis
64. On September 7, 2022, the U.S. Department of Agriculture (USDA) approved the planting of 'Purple Tomato' developed by Norfolk Plant Sciences Ltd., John Innes Centre, United Kingdom. Which of the following statements are false about the Purple Tomato?
- The Purple Tomato produces increased levels of endogenous anthocyanins in the fruit
 - The purple fruit colour is due to the fruit-specific expression of the *Antirrhinum majus Del* and *Ros1* transcription factors
 - The Purple Tomato contains neomycin phosphotransferase (*NPTII*) gene as a selectable marker
 - NPTII* gene imparts resistance to antibiotics, kanamycin and neomycin
- a and c
 - b and d
 - All are false
 - None is false
65. Match the botanical terms that describe the surfaces of leaves and stems (A) with their correct description (B).
- | A | | B |
|--------------|---|---|
| a. Glabrous | - | i. Covered with small scale-like particles |
| b. Glaucous | - | ii. With a hairy surface |
| c. Pubescent | - | iii. Without hairs of any kind |
| d. Scurfy | - | iv. Covered with a whitish powder or waxy coating |
- a-iv, b-iii, c-ii, d-i
 - a-ii, b-iii, c-iv, d-i
 - a-ii, b-iv, c-iii, d-i
 - a-iii, b-iv, c-ii, d-i
66. In Bentham and Hooker's system, plants with two cotyledons in their embryo were classified into ____ sub-classes.
- Inferae, Heteromerae, and Bicarpellatae
 - Thalamiflorae, Disciflorae, and Calyciflorae
 - Polypetalae, Gamopetalae, and Monochlamydeae
 - None of the above

67. ___ are a family of cyclopentanone derivatives synthesized from linolenic acid via the octadecanoic pathway that regulates plant growth, defense responses, and development.
- A) Salicylates B) Jasmonates
C) Brassinosteroids D) Auxins
68. A researcher labelled a bacterial strain as $\Phi(arab'-lacZ^+)$. Identify the genotype of the strain.
- A) Deletion of nucleotide sequences between *araB* and *lacZ* genes
B) Fusion of a truncated *araB* gene with intact *lacZ* gene
C) Insertion of truncated *araB* gene into *lacZ* gene in lactose positive strain
D) Merging truncated *araB* gene into *lacZ* gene to get lactose positive strain
69. Identify the correct statement(s) from the following:
- a. Paracentric inversion includes the centromere in the inverted segment
b. The position of the break in the chromosome determines the type of inversion
c. Pericentric inversion does not include the centromere in the inverted segment
d. Inversion homozygote carries inversion on both chromosomes of a homologous pair
- A) a and b B) a and c
C) b and c D) b and d
70. What is plasmid curing?
- A) Using plasmid to cure potential pathogenic diseases
B) Eliminating plasmid from the host population
C) Preserving the plasmid in the host population
D) Polymerizing one plasmid with another to form a hybrid plasmid

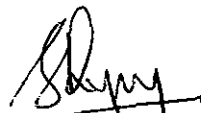
University of Hyderabad
Ph.D. Entrance Examinations - 2022

School/Department/Centre : Plant Sciences

Course : Ph.D. Subject : Plant Sciences and Microbiology

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	C	26	B	51	B
2	B	27	A	52	C
3	C	28	C	53	D
4	D	29	A	54	C
5	A	30	C	55	C
6	A	31	A	56	C
7	B	32	D	57	A
8	C	33	C	58	B
9	D	34	B	59	D
10	C	35	A	60	A
11	C	36	A	61	D
12	A	37	A	62	B
13	A	38	B	63	A
14	B	39	A	64	D
15	D	40	D	65	D
16	A	41	B	66	C
17	C	42	A	67	B
18	D	43	D	68	B
19	B	44	A	69	D
20	C	45	C	70	B
21	D	46	B		
22	C	47	B		
23	D	48	A		
24	A	49	A		
25	C	50	A		

Note/Remarks :


Signature 2/11/2022
School/Department/Centre
पौध विज्ञान संकाय / Dept. of Plant Sciences
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