ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ
PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90 Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- *Fill all the information in various columns, in capital letters, with blue/black ball point pen.*
- *Use of calculators is not allowed.*
- *All questions are compulsory. No negative marking for wrong answers.*
- *Each question has only one right answer.*
- *Questions attempted with two or more options/answers will not be evaluated.*

Stream: Life Sciences
Discipline / Branch: Bio-Technology
Name
Father's name
Roll No.
Signature of the candidate
Signature of the invigilator

1. Generation of antibody diversity in vertebrate animals takes place through:
a) The presence of as many genes in the germ line as there are types of antibodies possible.
b) Infection with bacteria carrying antibody genes
c) Infection with viruses carrying antibody genes
d) Rearrangement of DNA in tissues that go on to produce antibodies

2. Arabidopsis is advantageous for plant genetic research because:
a) It is commercially important as a food crop
b) It is an endangered species
c) it is the closest to humans of any existing plant
d) It is a small plant with a small genome size which can be raised inexpensively

3. 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 transcribed in specific cells
c) Measures the transfer frequency of genes during conjugation
d) Is used to detect genetic variation at the protein level.

4. Positional cloning refers to: a. using a selection procedure to clone
a) DNA
b) .Cloning a portion of a gene using PCR
(c) Isolating a gene by PCR using primers from another species
(d) Mapping a gene to a chromosomal region and then identifying and cloning a genomic copy of the gene from the region

5. Mitochondrial DNA is advantageous for evolutionary studies because:
a) It is inherited only through the female parent and thus evolves in a way that allows trees of relationship to be easily constructed
b) It is inserted into the Xchromosome
c) It first appeared in humans and is not found in other animals
d) It evolves more slowly than the genes in the nucleus

6. Which of the following is the best method to determine bacteriophages concentration in a sample.
a) Spectrophotometry
b) Plaque assay
c) Copy assay number
d) Light microscopy

7. Insertional inactivation of a gene helps in
a) Identification of recombinant clones
b) Identification of deletion mutants
c) Identification of suppression mutants
d) Elimination of recombinant clones

8. The Southern blotting technique depends on
a) similarities between the sequences of probe DNA and experimental DNA
b) similarities between the sequences of probe RNA and experimental RNA

c) similarities between the sequences of probe protein and experimental protein
e) The molecular mass of proteins

9. Problems in obtaining large amounts of proteins encoded by recombinant genes can overcome by using
a) BACS
b) Expression vectors
c) YACS
d) None of them

10. The first plant genome sequenced is
a) Wheat
b) Rice
c) Maize
d) Barley

11. What is the normal role of restriction endonucleases in bacterial cells
a) To degrade the bacterial chromosome into small pieces during replication
b) To degrade invading phage DNA
c) To produce RNA primers for replication
d) All the above

12. Infectious RNA particles without protein coat are
a) Virion
b) Prion
c) Viroid
d) Virusoid

13. One principal function of complement is to
a) Inactivate perforins
b) Mediate the release of histamine
c) Bind antibodies attached to cell surfaces and to lyse these cells
d) Phagocytize antigens

14. If the strand of DNA has 35 nucleotide how many phosphodiester bonds would exist
a) 34
b) 35
c) 24
d) 70

15. A buffer is a mixture of
a) Acid and Base
b) Weak acid and weak Base
c) Strong acid and its conjugate base
d) Weak acid and its conjugate base

16 Antibodies
a) are carbohydrates
b) are made from alpha and beta chains
c). contain no carbohydrate
d) contain heavy and light chains

17. Which of the following immunoglobulins is present normally in plasma at the highest concentration?
a) IgG
b) IgM
c) IgA
d) IgD

18. Agrobacterium based gene transfer is efficient
a) Only with dicots
b) Only with monocots
c) With both monocots and dicots
d) With majority monocots and few dicots

19. Myoglobin is a protein with
a) Primary Structure
b) Tertiary Structure
c) Quaternary Structure
d) Secondary structure

20. To differentiate self DNA from non self DNA, Self DNA should be
a) Glycosylated
b) Carboxylated
c) Phosphorylate
d) Methylated.

21.'Nif gene' for nitrogen fixation in cereal crops like wheat, jowar etc. is introduced by cloning
a) Rhizobium meliloti
b) Bacillus thuringiensis
c) Rhizopus
d) Rhizophora

22. Amino acid binding site of tRNA is
a) 5'end
b) Anticodon loop
c) DHU loop
d) CCA 3'end

23. A technique of using very small metal particles coated with desired gene in the gene transfer is Called
a) Electroporation
b) Microinjection
c) Liposome
d) Biolistic

24 VNTRs represnets-
a) New terminal regions in DNA
b) Functional genes in the DNA
c) Split genes in the sample DNA
d) Specific non-coding sequences with unique tandem repeats

25. Oxidtion of one pyruvic acid yield
a) 36 ATP b) 12 ATP
c) 15 ATP d) None of them

26. Yield Co efficient represent
a) Total Biomass or product produced
b) conversion efficiency of a substrate into product
c) conversion rate of a substrate into biomass or product
d) production time of biomass or product

27. The continuous cultures are used widely in the industry because
a) they are not suited for the production of secondary metabolites
b) contamination or mutation can have a disastrous effect on the operation
c) the government will not approve the licensing of pharmaceuticals produced in continuous culturesd) all of the above

28 The most common plasmid vector used in genetic engineering is
a) PBR 328
b) PBR 322
c) PBR 325
d) PBR 330

29.SDS in Polyacrylamide Gel Electrophoresis is used to
a) Stabile the proteins
b) Having uniform Charge density on proteins
c) Solublize the proteins
d) Decrease the surface tension of the buffer

30. Bacterial cell wall is made up of
a) Cellulose
b) Pectin
c) Peptidoglycan
d) Dextran

31. All the bacteria fix nitrogen except one
A. Rhizobium
B. Cynobacterium
C. coli
D. Azotobactor

32. P1 cloning vector is an example of
A. Plasmid
B. Cosmid
C. Bacteriophage
D. Phagemid

33. Cosmid vectors are
a) Plasmids that contain fragment of λ DNA including the cos site.
b) Phage the lacks cos site.
c) Cryptic Plasmids.
d) Plasmids that have no selection Marker.

34. The median of a sample will always equal the
a) mode
b) mean
c) 50th percentile
d) All of the above answers are correct

35. A mutation in a codon leads to the substitution of one amino acid with another. What is the name for this type of mutation.
a) nonsense mutation
b) missense mutation
c) frameshift mutation
d) promoter muttion

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37. Antibody diveesity is generated by
a) Protein splicing
b) Interchromosomal recombination
c) Somatic mutations
d) Allelic exclusion

38. In cell cycle level of protein cyclin falls in
a) G1 Phase
b) G 2 Phase
c) M phase
d) S Phase

39. Vectors designed to replicate in cells of two different species are called
a) Phagmid vectors
b) Shuttle vectors
c) Cosmid vectors
d) None of them.

40. First Transgeneic Plant Is
a) Potato
b) Tomato
c) Tobacco
d) Bringal

41. The secondary structure of the proteins is mainly maintained by
a) Ionic Bonds
b) Van der wals force
c) Hydrogen bonds
d) Hydrophobic bonds

42. Primary lymphoid organs include
a) Bone marrow and Thymus
b) Thymus,Spleen
c) Thymus,Spleen and lymph glands
d) All of them.

43. Taq polymerase requires
a) Afree end for adding nucleotides
b) Afree –OH end for adding
c) ucleotides
d) free both the ends for adding nucleotides

44. The information retrieval tool of NCBI is
a) Text Search
b) STAG
c) Entrez
d) Seqln

45. Northern hybridization is used to detect
a) Specific DNA
b) SpecificLipids
c) Specific Proteins
d) Specific RNA

46. Most commonly used probe for glycoproteins is
a) Antibody
b) Lectins
c) Interferons
d) Antigens

47. Which of the following is Sequence alignment tool
a) BLAST
b) PRINT
c) PIR
d) PROSIT

48. Proteins may be assisted in folding by a family of helper proteins known as
a) Heat shock proteins
b) Chaperon
c) Histone
d) Cofactor

49. Which of the following enzymes is used for the production of biodiesel?
a) Aspartase
b) Lipase
c) Rhamnosidase
d) Beta-galactosidase

50. Which of the followings promotes glucose and amino acid uptake by muscle?
a) Adrenaline
b) Insulin
c) Glucagon
d) Cortisol

51. The main stores of glycogen are found in—
a) Adipose tissues
b) Skeletal muscles
c) Brain
d) Erythrocytes

52. Two dimensional gels are used
a) Separate DNA fragments
b) Separate RNA fragments
c) separate different proteins
d) separate DNA from RNA

53. A compound which has desirable properties to become a drug is
a) Fit compound
b) Lead
c) Fit drug
d) Find

54. A database of current sequence map of Human genome is called as
a) OMIM
b) HGMD
c) Golden path
d) GeneCards

55. Phylogenetic relationship can be shown by
a) Dendrogram
b) Gene Bank
c) Data retrieving tool
d) Data search tool

56 Which of the following is a nucleotide sequence database?
a) EMBL
b) SwissProt
c) TrEMBL
d) PROSITE

57. BLOSUM matrices are used for
a) Multiple sequence Alignment
b) Pairwise sequence Alignment
c) Phylogenetic Analysis
d) All the above

58. In mutations when adenine is replaced by Thymine It is
a) Transitions
b) Frameshift mutations
c) Transcriptions
d) Transversions

59. The codon for anticodon 3' UUUA 5' is
a) 5' AAAU3'
b) 5' UUUA3'
c) 3' UAAD5'
d) 3' AUUU5'

60. An Hfr strain of E. coli contains:
a) Vector of yeast or bacterial origin which is used to make many copies of a particular DNA sequence
b) a bacterial chromosome with a human gene inserted
c) a bacterial chromosome with the F factor inserted
d) a human chromosome with a transposable element inserted

61. What are the assumptions of Hardy Weinberg equilibrium?
a) Small population size, random mating, no selection, no migration, no mutation
b) Large population size, random mating, no selection, no migration, no mutation
c) Large population size, random mating, heterozygotes survive the best, no migration, no mutation
d) Large population size, like individuals mate, no selection, no migration, no mutation

62. QTL analysis is used to:
a) identify RNA polymerase binding sites
b) map genes in bacterial viruses
c) determine which genes are expressed at a developmental stage
d) identify chromosome regions associated with a complex trait in a genetic cross

63. Formation of end product by Lactococcus Lactis will become non growth as lactic acid accumulates
a) Cells will redirect ATP to anabolism.
b) Cells will redirect NAD+ to anabolism.
c) Cells will redirect ATP to facilitate thee diffusion of ATP and H+ ions out of the cell.
d) Cells will redirect ATP to active transport of lactic acid and and H+ ions out of the cells

64. First discovered Type II endonuclease was
a) Hinf I
b) Eco K
c) Hind II
d) ECO RI

65. X rays cause
a) Formation of Thymine dImers
b) Ionozation of water molecules
c) Heat production
d) Non of above.

66. Mixing per unit volume is observed to be poorest in

a) Continuous packed bed reactor
b) Continuous airlift bioreactor
c) Continuous fluidized bed bioreactor
d) None of above.

67. The cells primarily involved in immune mechanism are

a) Eosionophils
b) Thromocytes
c) Erythrocytes
d) Lymphocytes

68. Down's syndrome is primarily due to

a) Crossing over
b) Non disjunction of homologus chromosomes
c) Linkage
d) Sex linked inheritance

69. Which of the following can be dignosed by aminocentesis

a) Down's syndrome
b) Sickle cell anemeia
c) Cystic fibrosis
d) All the above

70. Both the husband wife are not colour blind but their fathers are colour blind . What is the probability of their daughters having colour blindness.

a) 0 %
b) 75%
c) 25%
d) 100%

71. Under which of the following conitions the population gene frequency will remain same.

a) Selection for homozygotes
b) Small population
c) Genetic drift
d) Random mating

72. Fed batch reactor is used to produce vinegar

a) It can maintain low ethanol concentration
b) It can maintain low acetic acid concentration
c) Acetic acid bacteria tend to ferment at high ethanol concentration
d) All the above.

73. The amino acid which does not participate in transamination is

a) Glutamate
b) Lysine
c) Alanine
d) Tryptophan

74. Genome of an organism refers to its

a) total number of chromosomes
b) total haploid DNA
c) total number of genes
d) total number of proteins

75. The dietary fats are transported as

a) Micelles
b) Chylomicons
c) Fatty acid – Albumin complex
d) Liposomes

76. A fatty acid with 14 carbon atoms will under go how many cycles of Beta oxidation.

a) 4
b) 7
c) 8
d) 6

77. When populations are small gene frequency of some allele may become fixed ina population due to

a) Assortive mating
b) Inbreeding
c) Genetic Drift
d) Cross breeding

78. The difference between the largest and the smallest data values is the
a) Vriance
b) Interquartile range
c) Range
d) Coefficient of variation

79. The most frequently occurring value of a data set is called the
a) range
b) mode
c) mean
d) median

80. The most important statistical descriptive measure of the location of a data set is the
a) mean
b) median
c) mode
d) variance

81. Protoplasts are the cells devoid of
a) Cell wall
b) Plasma membrane
c) Both cell wall and plasma membrane
d) None of the above.

82. Which of the following is not a molecular graphic program intended for the visualization of proteins and small molecules?
a) RASMOL
b) SPDV
c) Modeler
d) Gene finder

83. The numerical value of the standard deviation can never be
A. larger than the variance
B. zero
C. negative
D. smaller than the variance

84. Technique most suitable for the detection of gene product
a) Northern Blotting
b) Southern Blotting
c) Western Blotting
d) Dot Blotting

85. The symbol ^{2} is used to represent
a) the variance of the population
b) the standard deviation of the sample
c) the standard deviation of the population
d) the variance of the sample

86. The coefficient of correlation
a) is the same as the coefficient of determination
b) can be larger than 1
c) cannot be larger than 1
d) cannot be negative

87. Chromosomal transfer occurs during conjugation only if.:
a) The F factor is integrated into the chromosome
b) Both cells are donors
c) pili are absent
d) Mutations occur simultaneously

88. An increase Tm(melting temperature) for a ds-DNA may be due to high content of
a) A+G
b) A+T
c) C+G
d) none of the above

89. Rennet is used in
a) Bread making
b) Fermentation
c) Cheese making
d) Antibiotics synthesis

90. Chargaff found that for DNA
a) The ratio of A to C is close 1:1 and the ratio of G to T is close to 1:1
b) The ratio of A ti t is close to 1:1 and the ratio of G to C is close to 1:1
c) The ratio of A to G is close to 1:1 and the ratio of T to C is close to 1:1
d) A+T = G+c