



# 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** ( Engg/Arch/Pharm/Mgmt/App.Sci/life  
Sci/Lang/Humanities ) .....

**Discipline / Branch** .....Biotechnology.....

**Name** .....

**Father's name** .....

**Roll No.** .....Date : 15<sup>th</sup> July 2012

**Signature of the candidate** .....

**Signature of the invigilator** .....

1. Since most somatic (body) cells of the fruit fly have 8 chromosomes each, the Zygotes would have:

- (A) 2 Chromosomes
- (B) 4 Chromosomes
- (C) 16 Chromosomes
- (D) 8 Chromosomes

2. Chargaff, in analyzing DNA found that the amount of

- (A) cytosine equaled that of guanine.
- (B) cytosine equaled that of thymine
- (C) cytosine equaled that of adenine
- (D) each nucleotide was unrelated

3. A test score is used to:

- (A) demonstrate whether two genes are linked.
- (B) test whether an organism expressing the dominant phenotype is homozygous or heterozygous.
- (C) show whether inheritance is polygenic or mendelian .
- (D) determine whether a trait is sex linked or autosomal.

4. When compared to a gene a v-oncogene

- (A) has DNA sequence similar to m-RNA sequence.
- (B) has DNA sequence similar to r-RNA sequence.
- (C) has DNA sequence similar to genomic DNA sequence

5. When compared to gene a pseudogene has  
 (A) same DNA sequence  
 (B) same regulatory DNA sequence.  
 (C) same mRNA sequence  
 (D) same rate of gene expression.
6. mRNA has the same sequence as:  
 (A) coding strand of gene.  
 (B) non coding strand of gene.  
 (C) antisense strand of DNA.
7. DNA footprinting is the technique:  
 (A) to determine DNA- DNA interaction.  
 (B) to determine DNA- Protein interaction  
 (C) to determine RNA – protein interaction  
 (D) to determine DNA – RNA interaction.
8. One of the following is not a stop codon.  
 (A) UAA  
 (B) UGA  
 (C) UGA  
 (D) UGG
9. Enzyme used for 5' end labelling of DNA fragments is:  
 (A) DNA ligase  
 (B) Terminal transferase  
 (C) Alkaline phosphatase  
 (D) DNA polymerase
10. Analysis of a sample of dsDNA shows it to be constituted of 24% A bases. The percentage of C in the sample is:  
 (A) 24%  
 (B) 26%  
 (C) 52%  
 (D) 48%
11. Which of the following is not a histone methylation:  
 (A) Acetylation  
 (B) merostylation  
 (C) methylation  
 (D) Phosphorylation
12. Sigma factor is important in transcription:  
 (A) Termination  
 (B) Initiation  
 (C) Elongation
13. Which one of the following type of mutations can revert back to wild type:  
 (A) Insertion.  
 (B) Deletion.  
 (C) Transition due to base analogues.  
 (D) Transition due to hydroxylation.
14. Which one is not a basic dye?  
 (A) Methylene blue  
 (B) Basic fuchsin  
 (C) Crystal violet  
 (D) Eosine
15. Bacterial endospore heat resistance is due to the presence of  
 (A) Dipocholinic acid  
 (B) Mg-dipocholinate  
 (C) Ca-dipocholinate  
 (D) Mn-dipocholinate
16. Which is the electron acceptor during respiration process in methanogens  
 (A) Carbon dioxide  
 (B) Sulphates  
 (C) Nitrates  
 (D) Ferric ions
17. Pick the odd one out of the following nitrogen fixers  
 (A) *Azotobacter*  
 (B) *Rhizobium*  
 (C) *Nostoc*  
 (D) *Anabena*
18. Shine-Dalgarno sequence is present in mRNA of  
 (A) *Sachharomyces*  
 (B) *Pichia*  
 (C) *Aspergillus*  
 (D) *Salmonella*

19. Which of the following viruses has double stranded DNA
- (A) Small pox virus
  - (B) Rabies virus
  - (C) Measles virus
  - (D) Influenza virus
20. Which of the following antibiotics is antifungal
- (A) Ampicillin
  - (B) Nystatin
  - (C) Polymyxin
  - (D) Chloramphenicol
21. Which of the following virus is associated with insects
- (A) Baculovirus
  - (B) Baculovirus
  - (C) Baculovirus
  - (D) Baculovirus
22. The etiology of anthrax was provided by
- (A) Liebig
  - (B) Robert Koch
  - (C) Joseph Lister
  - (D) S. Waksman
23. Which of the following are secondary metabolites
- (A) Organic acids
  - (B) Amino acids
  - (C) Antibiotics
  - (D) All
24. Impellers in the fermenter help in
- (A) Aeration
  - (B) Mixing of components
  - (C) Inoculation
  - (D) Medium entry
25. The maturing of fermented beer is known as
- (A) Malting
  - (B) Lagering
  - (C) Mashing
  - (D) Worting
26. Industrially used bacterium for ethanol production is
- (A) *Methylophilus*
  - (B) *Bacillus* sp.
  - (C) *Zymomonas*
  - (D) None
27. Which alcohol is added to make fortified wines
- (A) Methyl
  - (B) Ethyl
  - (C) Propyl
  - (D) Butyl
28. Penicillium inhibits gram positive bacterial growth by inhibiting synthesis of
- (A) Cell wall
  - (B) Cell membrane
  - (C) Ribosomes
  - (D) Lipopolysaccharides
29. A novel lipase is produced commercially by genetically engineered
- (A) *Lactobacillus*
  - (B) *Escherichia coli*
  - (C) *Aspergillus niger*
  - (D) *Pseudomonas*
30. Majority of antibiotics are produced from
- (A) Fungi
  - (B) Yeasts
  - (C) Actinomycetes
  - (D) Viruses
31. Microorganism currently used for penicillin production is
- (A) *Penicillium notatum*
  - (B) *P. chrysogenum*
  - (C) *P. roqueforti*
  - (D) *Streptomyces* sp.
32. Which of the following industrial products is not produced fermentatively
- (A) Enzymes
  - (B) Amino acids
  - (C) Steroids
  - (D) Silica

33. The first commercial product produced using rDNA technology is
- Steroid
  - Lipase
  - Insulin
  - Beta carotene
34. Novel bioreactor in biotechnology is
- Fluidized bed reactor
  - Stirred tank reactor
  - Packed bed reactor
  - Airlift reactor
35. Sensors which penetrate into the interior of fermenters are
- On line sensors
  - In line sensors
  - Off line sensors
  - None of these
36. The acceptable degree of contamination in industrial fermentation is
- $10^{-5}$
  - $10^{-1}$
  - $10^{-3}$
  - $10^{-4}$
37. Which of the following is used as antifoam agent in fermenters?
- Glycerol
  - Silicone
  - Acetone
  - Biotin
38. Proteins may be assisted in folding by a family of helper proteins known as
- Heat shock proteins
  - Chaperon
  - Histone
  - Cofactor
39. Which of the following enzymes is used for the production of biodiesel?
- Aspartase
  - Lipase
  - Rhamnosidase
  - Beta-galactosidase
40. Which of the following is not true for homologs?
- Sequences share a common ancestor
  - Mutations have been found to occur in nature that significantly affect degree of homology.
  - There are no homologs of inserted or deleted in a compared sequence pair.
  - Homology does not reflect true evolutionary relationship between two or more sequences.
41. Which of the following statements is incorrect?
- BLAST stands for basic local alignment search tool.
  - BLAST algorithm is introduced by S. Altschul et al.
  - BLASTp searches for protein sequence matches using PAM or BLOSUM matrices to score the ungapped alignments.
  - No variation of the BLAST algorithm is available for searching open reading frames in a nucleotide sequence.
42. Which of the following is not a secondary database?
- CATH
  - PROSITE
  - ENZYME
  - SAKURA
43. An algorithm that compares the six frame translation of a nucleotide query sequence against the six frame translation of a nucleotide sequence database.
- RPS-BLAST
  - BLASTx
  - t BLASTx
  - PSI- BLAST
44. Local alignment is not used for the following cases.
- Sequences of different lengths are compared.
  - Long sequence containing both coding and non-coding regions are compared.

- (C) Proteins from different protein families could not be compared to find conserved domains.  
(D) None of the above.
45. 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
46. \_\_\_\_\_ is used for submission of nucleotide to EMBL database.  
(A) Webin  
(B) Sakura  
(C) Sequin  
(D) Both a and c.
47. Which of the following facility is not extended by NCBI?  
(A) Entrez.  
(B) BankIt  
(C) ePCR  
(D) BRENDA
48. FASTA does not have ----- variation.  
(A) FASTX  
(B) TFASTX  
(C) TFASTY  
(D) tFASTAx
49. First Recombinant DNA molecules were generated by  
(A) Paul Berg & Boyer  
(B) Annie Chang  
(C) Stanley Cohen  
(D) All the above
50. Removes the phosphate group from the 5' end of a DNA.  
(A) DNA ligase  
(B) AP  
(C) Both a and b  
(D) None of the above
51. Shuttle Vector  
(A) pBR 322  
(B) pUC 19  
(C) YEplac  
(D) Both a and c
52. Find the odd one out  
(A) Retroviral vector  
(B) Adeno virus vector  
(C) Gemini virus vector  
(D) Papilloma virus vector
53. Vector containing two ori.  
(A) cosmid vector  
(B) Plasmid vector  
(C) Shuttle vector  
(D) Expression vector
54. 5-Bromuracil induces mutations because it  
(A) replaces a T and binds to G rather than A  
(B) replaces a G and binds to A rather than C  
(C) changes the binding affinity of G  
(D) changes the binding affinity of T
55. Many bacteria acquire antibiotic resistance by the transfer of \_\_\_\_\_ from a resistant organism to a sensitive one.  
(A) pili  
(B) mutations  
(C) plasmids  
(D) endospores
56. Bacteria that are resistant to penicillin and related antibiotics produce an enzyme that breaks the \_\_\_\_\_ in these antibiotics.  
(A) side groups (R groups)  
(B) benzene ring  
(C) beta-lactam ring  
(D) disulfide bonds
57. 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
58. For separation of DNA fragments in the range of 200-1000 Kb one would employ  
(A) Paper chromatography  
(B) pulse field gel electrophoresis  
(C) HPLC  
(D) PAGE
59. cdc2 is found to be maximally active during  
(A) M phase  
(B) G1 phase  
(C) S phase  
(D) G2 phase
60. Who discovered complement?  
(A) Landsteiner  
(B) Metchnikoff  
(C) Robert Koch  
(D) Jules Bordet
61. How many constant domains are present in alpha chain of immunoglobulin  
(A) 2  
(B) 3  
(C) 4  
(D) none
62. Which Immunoglobulin is Secretory antibody  
(A) IgM  
(B) IgD  
(C) IgG  
(D) None of above
63. Agrotope is a part of  
(A) antigen  
(B) antibody  
(C) MHC molecule  
(D) complement
64. Idiotope is present on :  
(A) antigen  
(B) antibody  
(C) MHC molecule  
(D) complement
65. IL 1 is secreted by :  
(A) T cells  
(B) B Cells  
(C) Macrophages  
(D) neutrophils
66. MHC class II molecules are present on :  
(A) T helper cells and B cells  
(B) B cells only  
(C) T cytotoxic cells only  
(D) Macrophages only
67. Monoclonal antibodies are formed by :  
(A) Single T cell clone and multiple epitopes  
(B) Single B cell clone but multiple epitopes  
(C) Single T cell clone and single epitope  
(D) Single B cell clone but single epitope
68. RPMI 1640 is  
(A) basal medium,  
(B) Rich medium,  
(C) specific medium  
(D) None,
69. Which cells have maximum glass adherence property:  
(A) Fibroblasts,  
(B) Epithelial cells  
(C) Macophages  
(D) Lymphocytes
70. Foetal calf serum is the most preferred serum for ATC because  
(A) It is rich in nutrients  
(B) it is easily available  
(C) It is free of antibodies  
(D) It is non toxic
71. The BHK cell line is derived from  
(A) Brain  
(B) heart  
(C) Kidney  
(D) None
72. If the cells are growing in the culture the pH of the medium

- (A) becomes acidic  
 (B) Becomes alkaline  
 (C) Does not change  
 (D) First becomes acidic then alkaline
73. Lymphocytes form  
 (A) Anchorage dependent cell line  
 (B) Suspension culture  
 (C) Monolayer culture  
 (D) Can not be cultured
74. Serum is sterilized by :  
 (A) autoclaving  
 (B) Filtration  
 (C) Boiling  
 (D) U.V. radiation
75. 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
76. Which one of the following non-standard amino acids is an important constituent of glutathione peroxidase  
 (A) 4-Hydroxy proline  
 (B) 5-Hydroxy lysine  
 (C) Desmosine  
 (D) Seleno cysteine
77. During competitive inhibition of an enzyme  
 (A) Both  $K_m$  and  $V_{max}$  will decrease  
 (B) Both  $K_m$  and  $V_{max}$  will increase  
 (C)  $K_m$  will increase and  $V_{max}$  remains unchanged  
 (D)  $K_m$  will decrease and  $V_{max}$  remains unchanged
78. Which one of the following is a peptide ionophore that binds  $K^+$  ions  
 (A) Monensin  
 (B) Valinomycin  
 (C) Actinomycin  
 (D) None of these
79. Which one of the following is an active aldehyde group carrier during alcohol fermentation  
 (A) Peridoxal phosphate  
 (B) FAD  
 (C) Thiamine Pyrophosphate  
 (D) NADP
80. Which one of the following enzyme catalyses an anaploretic reaction  
 (A) Pyruvate carboxylase  
 (B) Succinate dehydrogenase  
 (C) Glutamine dehydrogenase  
 (D) Aconitase
81. Which one of the following is a key intermediate in biosynthesis of Aromatic amino acids  
 (A) Shikimate  
 (B) Chorismate  
 (C) Anthranilate  
 (D) 5-Dehydro shikimate
82. Which one of the following interaction is strongest off all  
 (A) Electrostatic

- (B) Vander Waals  
 (C) Hydrogen bond  
 (D) All have same strength
83. Which one of the following is a membrane bound enzyme of mitochondria  
 (A) Succinate dehydrogenase  
 (B) Alpha- ketoglutarate Dehydrogenase  
 (C) Fumarase  
 (D) None of these.
84. The L.P.P.  $\max z = X_1 + X_2 + X_3 + X_4$   
 $X_1, X_2, X_3, X_4 \geq 0$   
 (A) has no solution  
 (B) has an unbounded solution  
 (C) cannot be solved  
 (D) none of these
85. The complete solution of a differential equation contains arbitrary constants  
 (A) more than the order of the equation  
 (B) can't say  
 (C) equal to the order of the equation  
 (D) less than the order of the equation
86. A square matrix of order n is diagonalizable if and only if  
 (A) it has n linearly independent vectors  
 (B) one vector is a linear combination of the remaining vectors  
 (C) it has n linearly dependent vectors  
 (D) None of these.
87. Inverse Laplace Transform of  $e^{-2s}/s^2$  is  
 (A)  $(t+2) U_2(t)$   
 (B)  $(t-2) U_2(t)$   
 (C)  $t e^{2t}$   
 (D) None of these
88. The geometric series  $1 + Z + Z^2 + \dots$  is  
 (A) uniformly convergent in any closed disk  $|z| \leq r \leq 1$   
 (B) uniformly but not absolutely convergent in  $|z| \leq r \leq 1$   
 (C) Absolutely uniformly convergent in  $|z| \leq r \leq 1$   
 (D) None of these
89. Sterilization of explant for Plant Tissue culture is done by  
 (A) U.V irradiation  
 (B) Autoclaving  
 (C) Alcohol  
 (D) Mercuric Chloride
90. Browning in the Plant Tissue Culture occurs due to the  
 (A) excessive salts  
 (B) Steroids  
 (C) Phenols  
 (D) All above