



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 .....MLT.....

Name .....

Father's name .....

Roll No. ....Date : .....15th July 2012.....

Signature of the candidate .....

Signature of the invigilator .....

- c.) sequence of nucleotides  
d.) all
7. If the ratio  $(A+G)/(T+C)$  in one strand of DNA is 0.7, what is the same ratio in the complementary strand?  
a.) 0.7  
b.) 1.43  
c.) 0.35  
d.) none
8. GC- rich DNA has higher stability than AT-rich DNA because  
a.) fewer  $\text{Na}^+$  ions bind to AT bp  
b.) GC base pairs have three H-bonds  
c.) GC base pairs wind the double helix more tightly  
d.) stacking interactions are stronger in GC bp
9. The following sequence best arranges t RNA, rRNA and DNA in order of increasing molecular weights  
a.) t RNA, DNA, rRNA  
b.) t RNA, rRNA, DNA  
c.) r RNA, t RNA, DNA  
d.) r RNA, DNA , tRNA
10. Thymidylate synthetase is an enzyme involved in the synthesis of TMP from  
a.) dUMP  
b.) UMP  
c.) thymidine  
d.) TDP
11. Cellulose is indigestible by humans because we lack the enzyme that hydrolyses  
a.)  $\alpha$ -1,4 glycosidic bonds  
b.)  $\alpha$ -1,6 glycosidic bonds  
c.)  $\beta$ -1,4 glycosidic bonds  
d.) long chain polysaccharides
12. Glycogen synthase is characterized by all of the following statements except  
a.) the enzyme exists in active and inactive forms  
b.) uridine diphosphate glucose is a substrate  
c.) it is activated by phosphorylation  
d.) it requires a primer strand of glycogen
13. Which of the following is NOT amphipathic  
a.) phosphatidylcholine  
b.) cholesterol  
c.) oleic acid  
d.) succinate
14. Gangliosides contains  
a.) a ceramide structure  
b.) glucose or galactose  
c.) sialic acid  
d.) all of the above
15. Refsum's disease arises due to defective  
a.)  $\beta$ -oxidation pathway  
b.)  $\alpha$ - oxidation pathway  
c.)  $\omega$ - oxidation pathway  
d.) TCA cycle
16. Binding energy released in enzyme-substrate complex formation causes the  
a.) decrease in the free energy of product  
b.) decrease in the free energy of substrate  
c.) increase in the activation energy  
d.) decrease in the activation energy
17. Which of the following combinations is correct?  
a.) amylase-peptide bond  
b.) protease-phosphodiester bond  
c.) lipase-ester bond  
d.) nucleases-glycosidic bond
18. Lower value of Michaelis constant shows  
a.) greater affinity of the enzyme for the substrate  
b.) less affinity of the enzyme for the substrate

- c.) enzyme is allosteric  
d.) question is incomplete
19. An uncompetitive inhibitor of enzyme binds to  
a.) the active site of enzyme  
b.) site other than the active site  
c.) enzyme-substrate complex  
d.) any other site and modifies part of an enzyme
20. Biotin is involved in which of the following types of reactions?  
a.) hydroxylations  
b.) carboxylations  
c.) decarboxylations  
d.) dehydrations
21. Lipids that are found in biological membranes  
a.) are amphipathic  
b.) are commonly referred to as triacylglycerols  
c.) contain only unsaturated fatty acyl chains  
d.) are normally covalently associated with proteins
22. All membrane processes, such as pumping and channeling of molecules are carried out by  
a.) lipid  
b.) carbohydrate  
c.) nucleic acid  
d.) protein
23. The hyperpolarization of the cell membrane associated with the  
a.) activation of voltage-gated K<sup>+</sup> channels  
b.) activation of the Na<sup>+</sup> leaky channel  
c.) activation of the Ca<sup>+</sup> voltage gated channel  
d.) activation of voltage gated Na<sup>+</sup> channels
24. Treadmilling of actin filaments refers to  
a.) net assembly at both plus- and minus- end  
b.) net assembly at plus- end and net disassembly at minus- end  
c.) net disassembly at plus-end and net assembly at minus- end  
d.) net disassembly at both plus- and minus- end
25. In eukaryotes, which of the following is not a second messenger?  
a.) 1,2-diacyl glycerol  
b.) cyclic AMP  
c.) inositol 1,4,5-triphosphate  
d.) cyclins
26. Calmodulin activates protein kinases in response to a transient increase in  
a.) cAMP  
b.) calcium ions  
c.) DAG  
d.) NO
27. G1-phase of the cell cycle is usually absent in  
a.) HeLa cells in culture  
b.) early cleavage stage cells  
c.) senescent fibroblast cells  
d.) intestinal epithelial cells
28. Which of the following enzymes in glycolysis catalyzes a reaction that is essentially non-reversible?  
a.) phosphofructokinase  
b.) enolase  
c.) triose phosphate isomerase  
d.) phosphohexose isomerase
29. The oncoprotein *Ras* is a  
a.) kinase  
b.) ATPase  
c.) GTPase  
d.) phosphatase
30. Apoptosis refers to  
a.) limb regeneration in vertebrates  
b.) metamorphosis in *C.elegans*  
c.) genetically programmed cell death

- d.) formation of imaginal disc in *Drosophila*
31. Which of the following processes does not involve cytochrome c?
- oxidative phosphorylation
  - electron transport
  - apoptosis
  - TCA cycle
32. Dehydrogenase enzymes of the hexosemonophosphate shunt pathway are
- NAD specific
  - NADP specific
  - FAD specific
  - TPP specific
33. The mechanism of ATP formation both in chloroplast and mitochondria is explained by
- relay pump theory of Godlewski
  - Cholodny went's model
  - chemiosmotic theory
  - Munch's pressure/mass flow model
34. In the presence of light, pH of the lumen of thylakoid
- increases
  - decreases
  - remain same
  - none
35. Synthesis of sucrose during photosynthesis occurs in
- chloroplast
  - cytosol
  - vacuoles
  - amyloplast
36. Which of the following are TRUE of C4 photosynthesis?
- it seems to be advantageous in cooler climates
  - it has high compensation point for CO<sub>2</sub>
  - similar to the CAM photosynthesis pathway
  - all of the above
37. Sieve tube elements
- are the conducting elements of the phloem
  - have sieve plates with pores normally blocked with P-protein
  - must lose their plasma membranes to become fully functional
  - all of the above
38. The synthesis of DNA was shown to be template dependent and semi-conservative. This would predict that
- no organism can have a single stranded genome
  - RNA cannot serve as the genome of any organism
  - all single stranded genomes would be synthesized via a double stranded intermediate
  - template dependent DNA polymerases do not exist in nature
39. Mitochondrial DNA is replicated from
- a single *ori* site bidirectionally
  - two different *ori* sites in the same direction
  - two different *ori* sites at different times in opposite directions
  - many sites bidirectionally, like nuclear chromosomes
40. Which of the following are steps in a reassociation experiment?
- melting the DNA
  - reannealing the DNA
  - shearing the DNA into fragments
  - all of the above
41. Sigma subunit of RNA polymerase
- specifies the site for transcription
  - initiates replication
  - provides contact between ribonucleotides and DNA template
  - terminates transcription
42. Alternate splicing means that

- a.) the same gene can code for several different proteins
  - b.) several different genes can code for the same protein
  - c.) gene expression can be regulated at the level of transcription
  - d.) pieces of DNA can move around within the genome
43. In case of inducible *lac* operon, the transcription is inhibited by
- a.) the binding of repressor to operator
  - b.) the presence of lactose
  - c.) the interaction of repressor with lactose
  - d.) the interaction of lactose with operator
44. Which of the following amino acids has the greatest number of codons?
- a.) proline
  - b.) leucine
  - c.) tryptophan
  - d.) aspartic acid
45. Formylmethionine tRNA is present in
- a.) yeast
  - b.) bacteria
  - c.) insects
  - d.) mammals
46. A DNA mutation that results in no change in protein product produced is termed a
- a.) missense mutation
  - b.) nonsense mutation
  - c.) silent mutation
  - d.) frameshift mutation
47. Terminal transeferase is used
- a.) to add base at the 3'end of the DNA
  - b.) to add base at the 5'end of the DNA
  - c.) to carry out nick translation
  - d.) to transfer phosphate at the 3'end of the DNA
48. BAC, which can be used to clone large DNA fragments, is derived from
- a.) ColE plasmid
  - b.) F plasmid
  - c.) 2 $\mu$  plasmid
  - d.) Mu plasmid
49. Which of the following would be eliminated by *hot start* PCR?
- a.) aerosol contamination from the barrel of pipetors
  - b.) addition of a nucleotide to the terminal end of PCR products
  - c.) infidelity of DNA copying by Taq DNA polymerase
  - d.) formation of primer-dimers
50. The DNA fingerprinting involves
- a.) chain terminators
  - b.) degenerate oligonucleotides
  - c.) VNTR loci
  - d.) RFLPs
51. If a diploid cell contains six chromosomes, how many possible random arrangements of homologous could occur during Metaphase-I?
- a.) 4
  - b.) 8
  - c.) 6
  - d.) 64
52. When a man with hypertrichosis marries a normal woman, what percentage of their sons would be expected to have hairy ears?
- a.) 50%
  - b.) 100%
  - c.) 0%
  - d.) 25%
53. In a trisomic individual the number of chromosomes is called
- a.) aneuploidy
  - b.) polytene
  - c.) polyploidy
  - d.) monoploidy
54. Streaming of protoplasm is absent in
- a.) parenchyma and collenchyma cells

- b.) bacterial cells and vessels
  - c.) cells of higher plants
  - d.) cells of hydrilla
55. Which of the following is an example of chemolithoautotroph?
- a.) sulphur-oxidizing bacteria
  - b.) hydrogen bacteria
  - c.) nitrifying bacteria
  - d.) all of these
56. Heterocyst of cyanobacteria
- a.) specialized for oxygenic photosynthesis
  - b.) forms spores
  - c.) are specialized for gamete formation
  - d.) are specialized for Nitrogen fixation
57. When cells conjugate for longer periods of time, which of the following will occur?
- a.) fewer genes will be transferred
  - b.) more genes will be transferred
  - c.) the same number of genes will be transferred
  - d.) it is impossible to tell because conjugation time and number of genes transferred are not related
58. An envelope is acquired during which of the following steps?
- a.) penetration
  - b.) release
  - c.) lysis
  - d.) assembly
59. Mycoplasma are not inhibited by penicillin because they
- a.) do not have a cell wall
  - b.) produce penicillinase
  - c.) are gram -positive
  - d.) are gram -negative
60. Agreptope is the region of antigen that is interacting with
- a.) TCR
  - b.) MHC
  - c.) both TCR and MHC
  - d.) antibody
61. Monoclonal antibodies can be produced by
- a.) immunoprecipitation technology
  - b.) shot gun cloning technology
  - c.) hybridoma technology
  - d.) transgenic technology
62. The form of diabetes curable by insulin injection is
- a.) insulin dependent diabetes mellitus
  - b.) diabetes rugosa
  - c.) insulin independent diabetes mellitus
  - d.) none of the above
63. Which of the following properties of water is most directly related to its ability to rise in the capillary spaces of plants?
- a.) neutral pH
  - b.) high density
  - c.) low compressibility
  - d.) high surface tension
64. Carnivorous adaptations of plants mainly compensate for soil that has a relatively low content of
- a.) potassium
  - b.) nitrogen
  - c.) phosphate
  - d.) calcium
65. Ethylene receptor
- a.) is a membrane bound dimer of two component system
  - b.) is a soluble protein present in the cytoplasm
  - c.) has a chromophore similar to phytochrome
  - d.) it has pterin and flavin as prosthetic groups
66. Long term reflex actions such as cycling and swimming are controlled by
- a.) cerebellum

- b.) spinal cord
  - c.) hypothalamus
  - d.) cerebrum
67. The fovea of the eye
- a.) has the lowest light threshold
  - b.) is the region of highest visual acuity
  - c.) contains only red and green cones
  - d.) contains only rods
68. The most abundant protein in human blood is
- a.) transferrin
  - b.) albumin
  - c.)  $\gamma$ -globulin
  - d.) hemoglobin
69. Human chorionic gonadotropin
- a.) begins to be produced 4 months after fertilization
  - b.) is produced by the prostate gland
  - c.) is produced by the corpus luteum
  - d.) is present only if a successful fertilization has occurred
70. Which of the following hormones is a modified amino acid?
- a.) prostaglandin
  - b.) estrogen
  - c.) epinephrine
  - d.) progesterone
71. Which phylum is characterized by animals that have a segmented body?
- a.) cnidaria
  - b.) platyhelminthes
  - c.) porifera
  - d.) arthropoda
72. Vessels and companion cells are the characteristic features of
- a.) gymnosperms
  - b.) angiosperms
  - c.) pteridophytes
  - d.) fungi
73. Which of these ecosystems has the lowest primary productivity per square meter?
- a.) a salt marsh
  - b.) a grassland
  - c.) an open ocean
  - d.) a tropical rain forest
74. The climax plants in a desert would be expected to have the following adaptations
- a.) broad leaves and shallow root
  - b.) dull leaves and a thin epidermis
  - c.) large numbers of stomata on the upper of the leaves
  - d.) reduced leaf surface and deep root system
75. Which one among the following is the most important factors in speciation?
- a.) geographic isolation
  - b.) reproductive isolation
  - c.) ethological isolation
  - d.) ecological isolation
76. Which one of the following steroids is synthesized from cholesterol without being hydroxylated by 17  $\alpha$ -hydroxylase?
- a.) corticosterone
  - b.) cortisol
  - c.) Estradiol
  - d.) testosterone
77. Growth hormone stimulate uptake of glucose and amino acids by all tissues except:
- a) Neurons
  - b) Nephrons
  - c) Retinoblasts
  - d) epithelial
78. The first synthesized antimicrobial drug an arsenic derivative was:
- a) A Leewenhoek
  - b) L Pasteur
  - c) P Ehrlich
  - d) A Fleming

79. Agar a solidifying agent of media is chemically made of:

- a) glucopyranose
- b) galacturonic acid
- c) galactopyranose
- d) manopyranose

80. Hematoxylin and eosin used for histological studies is done by which type microscopy?

- a) electron
- b) fluorescent
- c) transmission
- d) all of above

81. Nomogram is graphical value used to calculate:

- a) Molar extinction coefficient
- b) molecular weight
- c) density
- d) g force to rpm

82. Sickle cell anemia Glu is replaced by?

- a) Leu
- b) Val
- c) Lys
- d) Ala

83. ABO blood groups were described by:

- a) Linus Pauling
- b) Landsteiner
- c) Ochoa
- d) Ochoa

84) While using Calcium as cofactor which buffer cannot be used?

- a) Citrate
- b) Phosphate
- c) lactate
- d) Tris

85) EGTA is used as chelator for which cation?

- a) Mg
- b) Ba
- c) Ca
- d) Zn

86. Multidrug resistance is due to?

- a) Mutations
- b) Transduction
- c) induction
- d) transfusion

87. In Chi square test which is true:

- a) Null hypothesis
- b) Degree of freedom
- c) both
- d) None

88. The absorbance of DNA is taken at which wave length during denaturation studies:

- a) 270
- b) 280
- c) 260
- d) 290

89) Mammalian cell eat by utilizing process called:

- a) Pinocytosis
- b) endocytosis
- c) both
- d) phagocytosis

90. The process of dissolving of blood clot is called set of proteolytic enzymes is called:

- a) Hemolysis
- b) Fibrinolysis
- c) Homeostssis
- d) Hemostasis