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) **…Life Sciences……**

Discipline / Branch **……Biotechnology……**

Name **……**

Father's name **……**

Roll No. **……Date : ……**

Signature of the candidate **……**

Signature of the invigilator **……**

1. A molecular technique in which DNA sequences between two oligonucleotide primers can be amplified is known as
    a. southern blotting
    b. northern blotting
    c. polymerase chain reaction
    d. DNA replication
2. In genetic engineering, a chimera is
    a. an enzyme that links DNA molecules
    b. a plasmid that contains foreign DNA
    c. a virus that infects bacteria
    d. a fungi
3. Protoplasts can be produced from suspension cultures, callus tissues or intact tissues by enzymatic treatment with
    a. cellulotyic enzymes
    b. pectolytic enzymes
    c. both cellulotyic and pectolytic enzymes
    d. proteolytic enzymes

4. Direct DNA uptake by protoplasts can be stimulated by
    a. polyethylene glycol (PEG)
    b. Decanal
    c. Luciferin
    d. all of these
5. Which of the bacteria is considered for biological leaching?
    a. T. thiooxidans
    b. T. ferrooxidans
    c. Ferrobacillus terrooxidans
    d. all of these
6. Using bovine papilloma virus (BPV) derived vectors, permanent cell lines can be obtained carrying a recombinant DNA
    a. episomally only
    b. integrated only
    c. either episomally or integrated at high copy number
    d. either episomally or integrated at low copy number
7. The yeast generated during the fermentation of beer is generally separated by
    a. Centrifugation
    b. Filtration
    c. cell disruption
    d. all of these
8. The yield of the antibiotic depends upon
    a. pH of the medium
    b. age of the inoculum
    c. composition of the medium
    d. all of these
9. Which of the following is not true about phagemid?
    a. Contain functional origin of replication of the plasmid and λ phage
    b. May be propagated as a plasmid or as phage in appropriate strain
    c. Contain λ att site
    d. Can only be propagated as phage
10. Nitrogen in the plant cell culture media is provided by either ammonia or nitrate salt. In the media
    a. utilization of ammonium cause culture pH to drop while utilization of nitrate cause culture pH to rise
    b. utilization of nitrate cause culture pH to drop while utilization of ammonium cause culture pH to rise
    c. utilization of both ammonium and nitrate result in rise in pH
    d. utilization of both ammonium and nitrate result in drop in pH
11. Which tropical fruit crop has been successfully engineered to be protected against a lethal virus?
    a. Passion fruit
    b. Papaya

c. Mango
d. Lychee

12. Which of the protein is involved in Alzheimer's disease?
    a. A4
    b. Amylin
    c. Fibrin
    d. Alzhemin
13. Toxicity due to accumulation of ammonia can be overcome
    a. by substituting glutamine by glutamate
    b. by controlled addition of glutamine at low level
    c. by removal of ammonia or ammonium from culture medium
    d. all of the above
14. What are different substrates used for ethanol production?
    a. Starch containing substrate
    b. Juices from sugarcane or molasses or sugar beet
    c. Waste product from wood or processed wood
    d. All of the above
15. Which of the following microorganism is used for the production of citric acid?
    a. Lactobacillus bulgaricus
    b. Saccharomyces cerevisiae
    c. Aspergillus niger
    d. Streptococcus lactis
16. 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
    d. the molecular mass of protein

17. Which of the following is considered as the disadvantage of conventional plant tissue culture for clonal propagation?
    a. Multiplication of sexually derived sterile hybrids
    b. Less multiplication of disease free plants
    c. Storage and transportation of propogates
    d. Both (b) and (c)
18. Human serum albumin has been synthesized by
    a. transgenic potato and tobacco plants
    b. transgenic maize plants
    c. transgenic wheat plants
    d. any of the above
19. Diethyl stilbestrol (DES), a synthetic estrogen causes
    a. chromosome lagging
    b. disruption of mitotic spindle

c. centriole elongation
d. all of the above

20. The approach (s), which is/are currently followed to produce human monoclonal antibodies, is/are known as
    a. transformation of antigen specific B lymphocytes (EBV)
    b. hybridization of 6-thioguanine-resistant human plasmacytoma with immune human lymphocytes
    c. combination of EB Vand hybridoma techniques
    d. all of these
21. During which phase of growth of Penicillium chrysogenum maximum antibiotic production takes place
    a. during the first phase
    b. during the second phase
    c. during the third phase
    d. same in all the phases
22. pBR 322 has/have which of the following selection marker(s)?
    a. Amp^r
    b. Tet^r
    c. Both (a) and (b)
    d. Kan^r
23. Which of the following growth regulator is added for shoot initiation during plant regeneration from callus?
    a. Auxins
    b. Cytokinins
    c. Gibberellins
    d. Brassinosteroids
24. Synthetic seeds are
    a. artificially synthesized seeds
    b. somatic embryos encapsulated in suitable matrix
    c. seeds of plants modified genetically
    d. none of these
25. If the RBC of human were kept in 0.9% NaCl solution, what sort of change will occur to RBC?
    a. Cell will Burst
    b. Cell will shrink
    c. No change to RBC
    d. RBC will destroy
26. Disaggregating of cells can be achieved by
    a. physical disruption
    b. enzymatic digestion
    c. treating with chelating agents
    d. all of the above
27. Problems in obtaining large amounts of proteins encoded by recombinant genes can often be overcome by using
    a. BACS

b. expression vectors
c. YACS
d. all of these

28. Recombinant vaccine for Hepatitis B virus has been synthesized against which of the following antigen?
    a. Viral core antigen (HBcAg)
    b. Viral surface antigen (HBsAg)
    c. e antigen (HBeAg)
    d. All of the above

29. Virulence trait of Agrobacterium tumefaciens is borne on
    a. chromosomal DNA
    b. tumour inducing plasmid DNA
    c. both chromosomal and plasmid DNA
    d. cryptic plasmid DNA
30. The tumor phenotype, which can be maintained indefinitely in tissue culture, results from the expression of genes on the
    a. T-DNA
    b. c-DNA
    c. r-DNA
    d. m-RNA
31. Yeast Replicating plasmids (YRp) carry
    a. Centromere
    b. Telomere
    c. autonomously replicating sequence
    d. both (a) and (c)
32. Some cross reactions with monoclonal antibodies (MAbs) can occur. Unexpected cross reactions occur more frequently with
    a. Ig Mabs
    b. IgG
    c. IgA
    d. IgE
33. Fermentation medium for oxytetracyclin (terramycin) consist of
    a. CSL, starch, $(NH_4)_2\ SO_4$, sodium chloride and $CaCO_3$
    b. CSL, $(NH_4)_2\ SO_4$, sodium chloride and $CaCO_3$
    c. CSL, starch,$(NH_4)_2\ SO_4$, ammonium chloride and $CaCO_3$
    d. CSL,$(NH_4)_2\ SO_4$, ammonium chloride and $CaCO_3$
34. A plasmid can be considered as a suitable cloning vector if
    a. it can be readily isolated from the cells
    b. it possesses a single restriction site for one or more restriction enzymes
    c. insertion of foreign DNA does not alter its replication properties
    d. All of the above
35. The controversy regarding the use of Bt corn is that it
    a. is potentially harmful to monarch butterflies

b. is a potential allergen to humans
c. both (a) and (b)
d. can contaminate groundwater

36. Somatic embryoids are
    a. identical with zygotic embryos and without seed coats
    b. identical with zygotic embryos and with seed coats
    c. non-identical with zygotic embryos and without seed coats
    d. non-identical with zygotic embryos and with seed coats
37. Which of the modification in hemoglobin is the cause of sickle cell anemia?
    a. A mutation in the beta chain
    b. A deletion in the beta chain
    c. Replacement of the B chain by D chain
    d. None of the above
38. Accumulation of lactate leads to
    a. increase in pH
    b. no change in pH
    c. reduction in the pH of culture hence loss of cell viability
    d. no loss of cell viability
39. Ethanol is produced by
    a. continuous fermentation
    b. batch fermentation
    c. both (a) and (b)
    d. none of these
40. Agrobacterium tumefaciens is
    a. a disease in humans that causes loss of sight
    b. a bacterium that can be used to introduce DNA into plants
    c. a fungi that is used to produce antibiotics in large amounts
    d. a disease in humans that causes loss of weight
41. Chemically synthesized DNA sequences for the two chains are separately inserted into the plasmid pBR 322 by the side of
    a. β-Galactosidase
    b. Galactokinase
    c. acid phosphatase
    d. Glucokinase
42. The size of the virulent plasmid of Agrobacterium tumefaciens is
    a. 40-80 kb
    b. 80-120 kb
    c. 140-235 kb
    d. >235 kb
43. Which of the following microorganisms leach metals out of rock ores and can accumulate silver?
    a. Pseudomonas aeruginosa
    b. Thiobacillus
    c. Pseudomonas putida
    d. Zoogloea ramigera

44. Which of the following viruses are used as vectors for transferring genes to animal cells?
    a. SV 40 virus
    b. Bovine papilloma virus (BVP)
    c. Retroviruses
    d. All of these
45. The cross linkage of antigens by antibodies is known as
    a. Agglutination
    b. complement fixation
    c. a cross reaction
    d. all of these
46. pH of the fermentation medium for chlorotetracyclins is
    a. 5-6
    b. 6-7
    c. 7-8
    d. 8-9
47. Which of the following is true for the ale beer?
    a. Top yeast of S cerevisiae is used
    b. Fermentation is quick and completes in 5-7 days
    c. Quantity of hops used is more than in lager beer
    d. All of the above
48. pH of the fermentation medium for chlorotetracyclins is
    a. 5-6
    b. 6-7
    c. 7-8
    d. 8-9
49. Which of the following bacteria genus is capable of oxidizing ammonia (NH_4)?
    a. Nitrospina
    b. Nitrobacter
    c. Nitrosococcus
    d. Nitrosobacter
50. Metabolic interference is a term used to describe a method to metabolize a compound and prevent the synthesis of something that is normally produced. What compound(s) have been targeted for metabolic interference in tomato?
    a. ACC (1-aminocyclopropane-1-carboxylic acid)
    b. SAM (S-adenosylmethionine)
    c. Both (a) and (b)
    d. AOA (aminooxyacetic acid)

51. Biochips are made up of
    a. semi-conducting molecules inserted into the protein frame work
    b. conducting molecules inserted into the protein frame work
    c. non-conducting molecules inserted into the protein frame work
    d. any of the above
52. Klinefelter syndrome is a manifestation of which chromosome aneuploidy?

a. XXX
b. XYY
c. XXY
d. None of these

53. If starch containing substrates are used for ethanol production, yeast strain can't be used directly because
    a. it doesn't contain amylases to hydrolyze starch
    b. starch is not a suitable substrate for the production of ethanol
    c. it is converted to pentose sugar
    d. none of the above
54. Vinegar is typically produced in fed batch reactors because
    a. a fed batch reactor can be used to maintain low acetic acid concentrations
    b. a fed batch reactor can be used to maintain low ethanol concentrations
    c. acetic acid bacteria tend to ferment at high ethanol concentrations
    d. all of the above
55. If the ends of the following polysaccharide are pulled, which one would stretch the most?
    a. Glycogen
    b. Starch
    c. Cellulose
    d. None of these
56. Which technique is used to introduce genes into dicots?
    a. Electroporation
    b. particle acceleration
    c. Microinjection
    d. Ti plasmid infection
57. The rate of degradation and microbes resistance to toxic pollutants remain better when the
    a. mixed cell population is used
    b. individual cell is used
    c. mixed cell population along with metals is used
    d. individual cell along with metal is used
58. Retroviruses have advantage for being used as vector for animal cells because
    a. they cover a wide host range
    b. infection does not lead to cell death, infected cells produce virus over an indefinite period
    c. viral gene expression is driven by strong promoters
    d. all of the above
59. In monoclonal antibody technology, tumor cells that can replicate endlessly are fused with mammalian cells that produce an antibody. The result of this cell fusion is a
    a. Hybridoma
    b. Myeloma

c. natural killer cell
d. Lymphoblast

60. Bock beer is prepared from
    a. roasted germinated barley seeds
    b. Rice
    c. Wheat
    d. Grapes
61. At normal pH, penicillin remains in
    a. aqueous phase
    b. solvent phase
    c. both (a) and (b)
    d. Precipitates
62. What type of long chain alcohol is esterified to plant chlorophyll molecules?
    a. Dolichol
    b. Farnesol
    c. Phytol
    d. None of these

63. Starch content of potatoes can be increased by using a bacterial gene, known as
    a. sucrose phosphate synthase gene
    b. ADP glucose pyrophosphorylase gene
    c. polygalactouranase gene
    d. none of the above
64. The disorder in which of the following may cause "Ehlers-Danlos Syndrome"?
    a. Dlashin protein
    b. Collagen protein
    c. Fibrin protein
    d. Globulin protein
65. For culturing, plasma from the adult chicken is preferred to mammalian plasma because
    a. it forms a clear and solid coagulum even after dilution
    b. it is too opaque
    c. it doesn't produce solid clots
    d. it forms a semi solid coagulum
66. Which of the following is used to check vortex and to improve aeration efficiency in a fermentor?
    a. Impeller
    b. Baffles
    c. Sparger
    d. All of these
67. For the recovery of citric acid after fermentation, $Ca(OH)_2$ is added to the slurry to
    a. precipitate calcium carbonate
    b. precipitate calcium citrate

c. precipitate calcium phosphate
d. precipitate calcium sulphate

68. Which of the enzymes catalyses the reaction through serine residue
    a. Thrombin
    b. Subtilisin
    c. Acetyl cholin esterase
    d. All of the above
69. The GRAS microorganisms should be
    a. Non-pathogenic
    b. Non-toxic
    c. Non-producers of antibiotics
    d. All of above and toxins
70. Which of the following has maximum protein efficiency ratio?
    a. Wheat protein
    b. Soya protein
    c. Milk protein
    d. Whey protein
71. COS site is present on which type of DNA molecule
    a. Φ X174
    b. T4 DNA
    c. Phage **λ**
    d. M13
72. The vectors that contain two origin of replication are called
    a. Expression vector
    b. Plasmid vector
    c. Shuttle vector
    d. Cosmid vector
73. A small fragment of radio-labelled DNA molecule complementary to the foreign DNA is called
    a. cDNA
    b. Palindromic DNA
    c. DNA probe
    d. Oligonucleotide
74. What will you say the transformation of raw genomic data into the organised knowledge?
    a. Genome sequencing
    b. In silico gene production
    c. Algorithms
    d. Genome annotation
75. Spirulina maxima is used to produce which of the following product
    a. Strepto-penicilin
    b. Dextran
    c. SCP
    d. Tartaric acid

76. What will you call the pluripotent cells isolated from inner cell mass of early embryo
    a. ES cell
    b. Hematopoitic cells
    c. Bone marrow cells
    d. All of the above
77. The cry gene expresses which of the following toxins
    a. β–exotoxin
    b. β–endotoxin
    c. δ–endotoxin
    d. Mycotoxin
78. In N-linked glycosylation , the oligosaccharide chain is attached to protein via
    a. Asparagines
    b. Arginine
    c. Serine
    d. Threonine
79. Diptheria toxin, tetracycline and streptomycine inhibit
    a. DNA repair
    b. DNa replication
    c. Transcription
    d. Translation
80. Glycolysis and gluconeogenesis are reciprocally coordinated. Which of the following will activate pyruvate carboxylase in gluconeogenesis ?
    a. Acetyl CoA
    b. Fructose-2,6-bisphosphate
    c. ADP
    d. ATP
81. Which of the following plasma proteins is secreted by lymphocytes
    a. C3 component of complement
    b. α1 – antitrypsin
    c. IgM
    d. Coagulation factor IX
82. A cell in G1 of interphase 12 chromosomes. How many chromatids will be found per cell during metaphase II of meiosis?
    a. 6
    b. 12
    c. 18
    d. 24
83. At what substrate concentration is the velocity(Vo) of an enzyme catalysed reaction is 25% of the Vmax
    a. ¾ K_m
    b. $4K_m$
    c. 1/3 K_m
    d. ¼ K_m

84. If a solution of double stranded DNA is heated above its melting temperature, its absorbance will
    a. Decrease
    b. Increase
    c. Initially increase and then decrease
    d. Initially decreases and the increases
85. Injection of dinitrophenol into a rat causes an immediate increase in its body temperature, because
    a. DNP acts as inhibitor of mitochondrial ATPase
    b. DNP blocks the electron transport chain
    c. DNP inhibit Succinate dehydrogenase
    d. DNP uncouples electron transport from oxidative phosphorylation
86. The basic blocking action of alkaloid colchicin on cell division is
    a. G_1 phase
    b. S phase
    c. G_2 phase
    d. M phase
87. Datura plants have been regenerated from anther, endosperm and embryo culture. Their respective ploidy level will be
    a. n , 2n and 2n
    b. n, 3n and 2n
    c. n, 2n and 3nn
    d. 2n, 2n and 2n
88. The photorespiration, glycolate and glyoxalate are produced sequentially in the following organelles. Choose the correct sequence
    a. Chloroplast and mitochondria
    b. Chloroplast and peroxysomes
    c. Peroxisomes and mitochondria
    d. Peroxisomes and chloroplast
89. Which of the following is not useful in identifying the amino terminal residue of the protein
    a. Cyanogen bromide
    b. Dansyl chloride
    c. Fluorodinitrobenzene
    d. Phenyl isothiocyanate
90. Green fluorescent protein (GFP) cloned from jelly fish has now wide application in biological research. The fluorescence emitted by GFP is due to
    a. Presence of two zinc ions in GFP protein
    b. Heme, that serves as a prosthetic group in GFP molecule
    c. Three amino acids within GFP molecule
    d. Whole GFP molecule