Previous Year Question Paper

of

G.A.T.E. (BT) 2002

BIOTECHNOLOGY

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING

EASY BIOLOGY CLASS
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K : Biotechnology

K1 For each sub-questions given below, four alternatives are provided of which only one is correct. Write the correct answer in the answer book by writing A, B, C or D along with the corresponding sub-question number. (25 X 1 = 25)

1.1 The precursor for penicillin-G biosynthesis during fermentation process is

(A) Phenylacetic acid
(B) Phenoxyacetic acid
(C) Acetic acid
(D) None of the above

1.2 Callus formation from mature tissue explant occurs through

(A) Dedifferentiation
(B) Redifferentiation
(C) Both (A) and (B) of the above
(D) None of (A) and (B)

1.3 RNA is very much susceptible to hydrolysis in alkali because

(A) It contains uracil residues in its structure
(B) Its 2'-OH group participate in intramolecular cleavage of phosphodiester backbone
(C) Cleavage occurs in the glycosylic bonds of purine bases
(D) Cleavage occurs in the glycosylic bonds of pyrimidine bases

1.4 The typical coenzyme present in the methanogens is

(A) Coenzyme A
(B) Coenzyme Q
(C) Coenzyme M
(D) None of the above

1.5 Large scale clonal propagation practically means raising a population of plantlets from

(A) A single cell
(B) A single explant
(C) Many explants from a single plant
(D) Many explants from a group of plants

1.6 T4 Polynucleotide kinase is used for

(A) Labelliong 3' ends of DNA
(B) Labelling 5' ends of DNA
(C) Creating blunt ends of DNA
(D) Dephosphorylation of DNA

1.7 Energy capture efficiency of the aerobic cells using glucose as a substrate is

(A) 50%
(B) 40%
(C) 30%
(D) 20%

1.8 Plant secondary metabolites production in suspension culture is mainly targeted for

(A) Obtaining metabolites in aseptic condition
(B) Enhanced in vitro production of desired metabolite
(C) Enhanced production of all metabolites
(D) Obtaining new metabolites

1.9 A plasmid cloning vector should contains all of the following sequences except

(A) Origin of replication
(B) Inducible promoter
(C) Selectable marker gene
(D) Multiple cloning sites

1.10 For scaling up of a bioreactor, the following parameter is assumed to be constant

(A) Airflow rate
(B) Diameter of the impeller
(C) Agitator speed
(D) Volumetric mass transfer coefficient

1.11 Stable transformation of plants is reliably obtained by

(A) *Agrobacterium* plasmid integration
(B) Electroporation
(C) Microinjection
(D) Silicon carbide whisker

1.12 In baculovirus expression vector foreign genes are expressed from the promoter of

(A) Polyhedrin gene
(B) Bacteriophage T7 gene
(C) *E. coli* lacZ gene
(D) Yeast phosphoglycerate kinase gene

1.13 Mechanism of separation of contaminants present in air by fibrous media are

(A) Interception
(B) Inertial impaction
(C) Diffusion
(D) All of the above

1.14 The length of each boarder sequence in Ti – plasmid is about

(A) 25 million base pairs
(B) 200 kilo base pairs
(C) 25 kilo base pairs
(D) 25 base pairs

1.15 Enzyme used in 'cycle' sequencing of DNA is

(A) T7 DNA polymerase
(B) T4 DNA polymerase
(C) Klenow DNA polymerase
(D) Taq DNA polymerase

1.16 Ethanol concentration is lowest in

(A) Wine
(B) Beer
(C) Brandy
(D) Rum

1.17 Plastome is

(A) A type of plastid
(B) An organellar genome
(C) Plasmalemma protein
(D) None of A / B / C

1.18 Recombinant live attenuated vaccine against hepatitis B was prepared from

(A) Plasma of chronically infected individual
(B) Recombinant yeast expressing hepatitis B surface antigen
(C) Recombinant vaccinia virus expressing hepatitis B surface antigen
(D) Transgenic plants expressing hepatitis B surface antigen

1.19 The following cross-linking agents may be used for the immobilization of enzymes

(A) Glutaraldehyde
(B) Cyanogen bromide
(C) Thionyl chloride
(D) All of the above

1.20 Which of the following statements is most appropriate for recombinant antibody production in transgenic plants?

(A) A very high level expression is always obtained
(B) Light promote more antibody production
(C) Such antibodies are free from other antigen of animal origin
(D) Functional antibody cannot be produced in plants

1.21 Cells deficient in hypoxanthine guanine phosphoribosyl transferase (HPRT) enzyme rely on

(A) Synthesis of purine deoxynucleotides by salvage pathway
(B) Synthesis of purine deoxynucleotides by de novo pathway
(C) Supply of hypoxanthine in the culture medium
(D) Supply of thymidine in the culture medium

1.22 Enhanced axillary branching for multiple shoot production is promoted by

(A) 2,4 - D
(B) Abscisic acid
(C) Gibberellic acid
(D) Benzyl adenine

1.23 The following culture systems are used for growing large amount of anchorage dependent animal cells except

(A) Roller bottle
(B) Airlift fermenter
(C) Hollow fibre reactor
(D) Microcarriers

1.24 Viral replication within cells is inhibited by

(A) IL - 4
(B) IL - 1
(C) IFNα
(D) TNFα

1.25 In large scale fermentation process, air is sterilized by

(A) Jute fiber
(B) Membrane
(C) Cotton fiber
(D) Glass wool fiber

K2 Match the organisms in **Column A** with the product in **Column B**. (5)

Column A	**Column B**
(A) *Thermus aquaticus*	1. Beer
(B) *Acetobacter aceti*	2. Bioinsecticides
(C) *Bacillus thuringensis*	3. Hind III
(D) *Saccharomyces carlbergensis*	4. Taq 1
(E) *Haemophilus influenzae*	5. Vinegar

K3 Match the secondary metabolites in **Column A** with their most appropriate chemical characteristics in **Column B**. (5)

Column A	Column B
(a) Diosgenin	1. Holoside
(b) Ajmalicine	2. Pyrrolizidine alkaloid
(c) Shikonin	3. Indole alkaloid
(d) Digoxin	4. Naphthoquinone nucleus
(e) Scopolamine	5. Cardenolide
	6. Saponin
	7. Tropane alkaloid

K4 (A) Name two metal ions which play important role in citric acid fermentation. (1)

(B) How is the agitator speed in a fermenter correlated with the power drawn by the agitator ? (1)

(C) How does the sulfanilamide kill the bacteria ? (1)

(D) Human insulin gene cloned from a cDNA library into pUC19 could not be expressed. Justify the reason. (1)

(E) Mention the specific role of acetosyringone in *Agrobacterium* mediated plant transformation ? (1)

K5 (A) The volume of a chemostat system is 1000 l. The feed flow rate to the reactor is 200 l/h and the glucose concentration in the feed is 5 g /l. Determine cell and glucose concentration in the effluent of the reactor under steady state conditions. Use the following constants for the cells:

$\mu_{max} = 0.3\ h^{-1}$, $K_S = 0.1$ g/l, $Y_{x/s} = 0.4$ (g dw cells/ g glucose) (3)

(B) Find out the dilution rate which gives maximum biomass productivity. (2)

K6 (A) What are the characteristics of 'normal' primary animal cells ? (2)

(B) Name different methods for the separation of different cell types from a mixed population of animal cells? (2)

(C) What is transgene ? (1)