

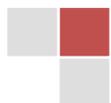
GRASSROOTS ACADEMY **GATE-BIOTECH 2005**

Correspondence Available

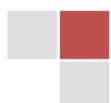
Grassroots is a premier GATE-BIOTECH Coaching at New Delhi, with the Best results including Rank 49, 71, 313 in GATE 2010 and Rank 77 in GATE 2011.
www.grassrootsacademy.in

GATE BIOTECHNOLOGY – 2005

1. Cells of meristemoid are best described as
 - (A) Differentiated and non dividing
 - (B) Dedifferentiated and diving
 - (C) Differentiated and diving
 - (D) Dedifferentiated and non dividing
2. Ultra filtration process cannot be used for
 - (A) Fractionation of proteins
 - (B) Desalting
 - (C) Harvesting of cells
 - (D) Selective removal of solvents
3. The number of replicons in a typical mammalian cells us
 - (A) 40 – 200
 - (B) 400
 - (C) 1000 – 2000
 - (D) 50000 – 100000
4. What product will result from complete hydrolysis of soluble dextrin?
 - (A) Sucrose only
 - (B) Fructose only
 - (C) Glucose and fructose only
 - (D) Glucose only
5. Aeration in a bioreactor is provided by
 - (A) Impeller
 - (B) Baffles
 - (C) Sparger
 - (D) All of the above
6. The transplastomic plants bear no risk for gene transfer through pollens as
 - (A) The pollens degenerate before fertilization
 - (B) The transformed mitochondrial DNA is lost during pollen maturation
 - (C) The transformed chloroplast DNA is lost during pollen maturation
 - (D) The transformed genomic DNA are inherited during maturation
7. The mobility of DNA in agarose gel electrophoresis is solely based on its
 - (A) Charge
 - (B) conformation
 - (C) Size
 - (D) none of the above
8. Which of the following fluorescent probes is used to monitor the progress of amplification in Real time PCR?
 - (A) SYBR green
 - (B) Rhodamine
 - (C) FITC
 - (D) Cyan blue
9. Expression of which of the following reporter gene does not require addition of specific-substrate for detection?
 - (A) Luciferase
 - (B) β – Glucuronidase
 - (C) β – Glucosidase
 - (D) Green fluorescent protein
10. Cibacron blue dye affinity chromatography can be used for affinity purification of
 - (A) NADPH dehydrogenase
 - (B) Glucoamylase
 - (C) Subtilin
 - (D) Caspase
11. A linear DNA fragment is 100% labeled at one end and has transition site for *EcoRI*. If it is partially digested by *EcoRI* so that all possible fragments are produced how many of these fragments will be labeled?
 - (A) 4 labeled: 6 unlabeled
 - (B) 4 labeled: 4 unlabeled
 - (C) 3 labeled: 5 unlabeled
 - (D) 3 labeled: 3 unlabeled



12. Match the following products with their starting substrates
- | | |
|----------|----------------|
| a) Sake | 1) apple juice |
| b) Cider | 2) grape juice |
| c) Wine | 3) barley |
| d) Lager | 4) rice |
- (A) a → 4, b → 1, c → 2, d → 3
(B) a → 1, b → 4, c → 2, d → 3
(C) a → 2, b → 3, c → 1, d → 4
(D) a → 3, b → 4, c → 2, d → 1
13. Identify the following antibiotics with their modes of action.
- | Antibiotic | Mode of action |
|-----------------|--------------------------------------|
| a) Ampicillin | 1) inhibition of protein synthesis |
| b) Tetracycline | 2) inhibition of cell wall synthesis |
| c) Nystatin | 3) damage of cytoplasm membrane |
| d) Anthramycin | 4) damage of DNA structure |
- (A) a → 1, b → 2, c → 4, d → 3
(B) a → 2, b → 1, c → 3, d → 4
(C) a → 1, b → 2, c → 3, d → 4
(D) a → 3, b → 4, c → 2, d → 1
14. In a bioreactor baffles are incorporated to
- (A) Prevent vortex and to improve aeration efficiency
(B) Maintain uniform suspension of cells
(C) Minimize the size of air bubble for greater aeration
(D) Maintain uniform nutrient medium
15. Somatic embryo from cotyledon explant would develop in the following sequential stages.
- (A) cotyledonary → heart → globular → torpedo
(B) Globular → torpedo → heart → cotyledonary
(C) Globular → heart → torpedo → cotyledonary
(D) cotyledonary → globular → heart → torpedo
16. Through the right border (RB) and left border (LB) of T-DNA are identical; the DNA transfer is specific for the DNA left of the RB (the T-DNA), rather than for the DNA left of the LB because
- (A) The sequence context at the RB defines the direction of transfer
(B) The sequence context at the LB defines the direction of transfer
(C) The nuclear location sequence (NLS) of VirD2 protein drives the excised T – strand
(D) The endonuclease activity of VirD2 protein allows nicking at RB
17. Determine the correctness or otherwise of the following Assertion [a] and Reason [r] Assertion: An antigen recognized by one immunoglobulin subtype is not recognized by any other subtype Reason: Immunoglobulin subtypes differ from each other both in the variable and in the constant regions
- (A) Both [a] and [r] are true and [r] is the correct reason for [a]
(B) Both [a] and [r] are true but [r] is not the correct reason for [a]
(C) Both [a] and [r] are false
(D) [a] is true but [r] is false
18. Identical sized RNA transcription is detected by Northern blot analysis of UDP glucuronosyl transferase obtained from human liver and kidney. Micro x ray analysis of the same samples



shows equal spot intensity, where Western to bolt detects a 55 kDa strong band in liver, but a very faint band in kidney of same size. The regulation of UDP glucuronosyl transferase is

- (A) Transcriptionally controlled
- (B) Post – transcriptionally controlled
- (C) Translationally controlled
- (D) Post – translationally controlled

19. Match the items on the left column with those on the right

Left

- P. Programmed cell death at site of infection
- Q. Hormone upregulated during flooding stress
- R. Target for herbicide glyphosate
- S. Pathogen-derived resistance

Right

- 1. TMV coat protein
- 2. EPSP synthase
- 3. Hyper sensitive response
- 4. Ethylene

- (A) P-1, Q-2, R-4, S-3
- (C) P-1, Q-4, R-2, S-3

- (B) P-3, Q-4, R-2, S-1
- (D) P-3, Q-2, R-4, S-1

20. Expression in amount and in inactive form of cDNA of a eukaryotic protein in *Escherichia coli* using its expression vector is due to

- (P) The absence of capping mechanism of mRNA
- (Q) Codon bias
- (R) Absence of polyadenylation
- (S) Absence of proper glycosylation

Common Data for Questions 21, 22, 23:

A recombinant SV40 virus delivers c-myc cDNA, which has a unique *Sal* I site, into muscle cells. Southern analysis of *Sal* I digested total genomic DNA of muscle cells using c-myc cDNA probe generates a smear.

21. The DNA smear obtained on Southern blot is due to

- (A) Head to head concatamer of viral DNA
- (B) Head to tail concatamer of viral DNA
- (C) Tail to tail concatamer of viral DNA
- (D) Random integration of viral DNA

22. Western blot analysis of c-myc expression of such transformed cells last for

- (A) Transiently
- (B) upto five generations
- (C) Upto 10 generations
- (D) more than 100 generations

23. Which of the following types of cancer will be observed in such transformed cells?

- (A) Adenoma
- (B) Melanoma
- (C) Sarcoma
- (D) Hepatoma

Common Data for Questions 25, 26:

Normal primary hepatocytes can be artificially immortalized. Certain spontaneous mutants of immortalized hepatocytes are sensitive to ionizing radiation.

24. Which of the following genes are involved in immortalization of primary hepatocytes?

- (A) Telomerase and Cyclin D
- (B) NFκB and Thymidine kinase
- (C) Cyclin D and myc
- (D) Telomerase and Ras

25. What would happen to the mutant cells by ionizing radiation?



- (A) Apoptosis
(C) Cell growth stress
- (B) Necrosis
(D) Cell proliferation

Linked Answer Questions 26a to 27b carry two marks each

An aliquot of competent *E. coli* cells were used for determinations of cell density by plasmid count method and another aliquot was used for transformation by plasmid DNA

26. (a) *E. coli* culture (1 ml) was diluted 1: 1000000 and 200 μ l of this was used for plating. After 12h incubation of the plate, the number of colony forming units (CFU) was 150. What is the total CFU per ml in the original culture?
- (A) 7.5×10^8
(B) 1.5×10^8
(C) 1.5×10^6
(D) 3.0×10^6

(b) Isolated plasmid DNA (5ng) was used for transformation of 100 μ l competent *E. coli* cells to which 900 μ l of SOC medium was added. An aliquot of 50 μ l was plated on a selective plate. After overnight incubation, 300 colonies were observed. Calculate the efficiency of transformation and the percentage of transformation cells per ml of parent culture.

- (A) 6.0×10^5 colonies pre μ g of plasmid DNA, 0.01%
(B) 1.2×10^5 colonies pre μ g of plasmid DNA, 0.02%
(C) 1.2×10^6 colonies pre μ g of plasmid DNA, 0.008%
(D) 6.0×10^6 colonies pre μ g of plasmid DNA, 0.1%

Statement for Linked Answer Question 27a & 27b

HMGCoA reductase that binds HMGCoA is the major rate limiting step in the cholesterol biosynthetic pathway. Several inhibitors of this enzyme are used as potential drugs. The assay of the enzyme is based on labeling the enzyme with radiolabeled HMGCoA and counting (cpm) the labeled enzyme substrate complex in the presence (test) and in the absence (control) of the inhibitor. A blank is set up that contains no enzymes

27. (a) The per cent inhibition for this enzyme is calculated from the equation
- (A) $\{[\text{cpm (control)} - \text{cpm (test)}] / [\text{cpm (control)} - \text{cpm (blank)}]\} \times 100$
(B) $\{[\text{cpm (control)} - \text{cpm (test)}] / [\text{cpm (blank)} - \text{cpm (control)}]\} \times 100$
(C) $\{[\text{cpm (test)} - \text{cpm (control)}] / [\text{cpm (control)} - \text{cpm (blank)}]\} \times 100$
(D) $\{[\text{cpm (control)} - \text{cpm (blank)}] / [\text{cpm (test)} - \text{cpm (control)}]\} \times 100$
28. (b) An inhibitor is considered active if it causes more than 65% inhibition. The cpm values respectively of control, test and blank samples for inhibitors W, X, Y and Z are given below some reaction of the inhibitors in active.
- (A) X – 8000, 4000 and 100
(B) W – 7000, 1400, and 135
(C) Y – 7500, 5000, and 90
(D) Z – 7200, 2800 and 200

