K : Biotechnology

Q.1 – 10 carry one mark each

Q.1 Which of the following processes require energy?

(A) ligation
(B) transformation
(C) restriction digestion
(D) hybridization

Q.2 To be a cloning vector, a plasmid does **NOT** require

(A) an origin of replication
(B) an antibiotic resistance marker
(C) a restriction site
(D) to have a high copy number

Q.3 In animal cell cultures, the addition of serum to media is essential for providing

(A) amino acids for protein synthesis
(B) nucleotides for DNA synthesis
(C) growth factors
(D) all of the above

Q.4 In the course of cell cycle, the level of the protein cyclin abruptly falls during

(A) G_1 phase
(B) S phase
(C) G_2 phase
(D) M phase

Q.5 Enzyme papain is used with success to

(A) increase meat production
(B) leaven bread
(C) ripen papaya fruit
(D) tenderize meat

Q.6 Microbes bring about biological transformation of xenobiotic compounds by

(A) degradation
(B) conjugation
(C) detoxification
(D) all of the above

Q.7 Which one of the following reactions is used for the purpose of recycling enzymes in bioprocesses?

(A) Isomerization
(B) Immobilization
(C) Phosphorylation
(D) Polymerization

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Answer Q.14–15 based on the data given below

Dr. Singh isolated a new 5-kb gene and wants to determine its sequence using a sequencer that can sequence upto 500 bases in a single reaction. Therefore, she decides to create subclones having suitable-size inserts for sequencing.

Q.14 Which one of the following will be the most appropriate restriction enzyme for this subcloning?

(A) 8-bp cutter
(B) 6-bp cutter
(C) 3-bp cutter
(D) 5-bp cutter

Q.15 To generate the minimum number of subclones needed for sequencing, what should be the size of the insert in these subclones?

(A) 1000 bp
(B) 500 bp
(C) 250 bp
(D) 2000 bp

Q.16 All of the following are true about DNA microarray technology except

(A) an electron microscope is used to gather data from the arrays
(B) the technology is used to assess transcription from multiple genes simultaneously
(C) the technology works best for organisms whose genome is completely sequenced
(D) the technology is derived from computer chip manufacture

Q.17 You have cut the genome of a double-stranded viral genome with a restriction endonuclease and electrophoresed the products on an agarose gel. You observe only one band on the gel, equivalent to the size of the genome. This is because

(A) there are no introns in the genome
(B) the introns contain the recognition sites and have already been spliced out
(C) all of restriction fragments are too small to detect
(D) restriction endonucleases do not cut RNA, and this virus has an RNA genome

Q.18 The restriction endonuclease Eco52I recognizes the sequence C/GGCGG and cuts between the first C and the first G, indicated by the slash. DNA cut by which of the following enzymes (given with their recognition sequences and cut sites) could be cloned into a plasmid digested with Eco52I?

(A) EcoRI (G/AATTC)
(B) XmaIII (C/GGCGG)
(C) SmaI (CCC/GGG)
(D) SacII (CCGC/GG)

Q.19 If bacterial cells are transformed with a mixture of linear and circular molecules resulting from a ligation reaction designed to produce a recombinant molecule

(A) no recombinant molecule will ever be detected
(B) both linear and circular molecules will replicate equally well
(C) none of the plasmids will express the antibiotic resistance gene located on the plasmid
(D) the circular molecules will be amplified by the cells

Q.20 What is the primary purpose of neomycin in creating mice with knock-outs in gene X?

(A) neomycin selects for the survival of embryonic stem cells (ES) that have incorporated the mutant gene X anywhere in the genome
(B) neomycin selects for the survival of ES cells that have incorporated the mutant gene in the place of the wild-type gene
(C) neomycin prevents *Candida* infection during ES cell culture that does not have gene X
(D) neomycin makes the gene X knock-out mice resistant to *Candida* infection

Q.21 Match the industrial application of the following enzymes

P Penicillinase	1 Pharmaceutical
Q Pectinase	2 Leather
R Trypsin	3 Wine
S Rennin	4 Dairy

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

Q.22 To optimize the bioreactor system, which one of the following conditions is least important for anaerobic fermentation?

(A) culture agitation to maintain oxygen supply
(B) restriction of the entry of contaminating organisms
(C) control of parameters like pH and temperature
(D) maintenance of constant culture volume

Q.23 Match the activity spectrum of the following antibiotics

P Actinomycin D	1 Antifungal
Q Daunorubicin	2 Antituberculosis
R Rifamycin	3 Antitumor
S Griseofulvin	4 Antiprotosoal

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

Q.24 Autoclaves are routinely used in laboratories for sterilization. It acts by

(A) disrupting cell membranes
(B) denaturing proteins
(C) changing physically membrane lipids
(D) all of the above

Q.25 All of the following are produced by animal cells in culture and help the cells adhere to the culture dish except

(A) glycoproteins
(B) collagen
(C) phospholipase A
(D) hyaluronic acid

Q.26 The following are useful to introduce genes into crop plants except

(A) Ti plasmid
(B) particle gun
(C) breeding
(D) auxin

Q.27 Power number, also called Newton's number, is defined as a dimensionless parameter relating to

(A) turbulent flow
(B) the relative velocity between the nutrient solution and individual cells
(C) energy required by the stirred reactors
(D) none of the above

Q.28 The selection of the appropriate purification method in the product recovery after microbial fermentation depends on the

(A) nature and the stability of the end products produced
(B) type of the side products present
(C) degree of purification required
(D) all of the above

Q.29 Which of the following techniques is **NOT** ideal for immobilizing cell-free enzymes?

(A) physical entrapment by encapsulation
(B) covalent chemical bonding to surface carriers
(C) physical bonding by flocculation
(D) covalent chemical bonding by cross-linking the precipitate

Q.30 The full-length coding sequence of an eukaryotic gene was expressed in bacteria and the protein was purified. However, in the functional assay, no activity was detected for the purified protein. The reason could be

(A) the host bacteria produced an enzyme that inhibited the activity of the expressed eukaryotic protein
(B) the purified protein was contaminated with bacteria
(C) the host bacteria did not produce the essential co-factors
(D) no post-translational modification on the protein expressed in bacteria

End of Section K