



Previous Year Solved Question Paper
of

G.A.T.E. (XL) 2004

LIFE SCIENCES

XL: Biochemistry

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING



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I : Biochemistry

Q.1-10 carry one mark each

- Q.1 The most abundant atom in a living organism is
(A) Hydrogen (B) Oxygen
(C) Nitrogen (D) Carbon
- Q.2 The coenzyme involved in transfer of carboxyl group is
(A) NADH (B) Coenzyme A
(C) S-Adenosyl methionine (D) Biotin
- Q.3 The unit of length 'Angstrom' equals to
(A) 10^{-6} m (B) 10^{-8} m
(C) 10^{-10} m (D) 10^{-15} m
- Q.4 Which of the following triplet does NOT code for any amino acid
(A) UUA (B) UCA
(C) UAA (D) UGU
- Q.5 Erythrocytes resist shearing forces while travelling through narrow blood vessels because they contain the meshwork of
(A) Glycophorin A (B) Spectrin
(C) Hemoglobin (D) Myoglobin
- Q.6 Tetrodotoxin, a highly poisonous toxin from Puffer fish acts on
(A) Sodium channel (B) Potassium Channel
(C) Chloride Channel (D) Calcium Channel
- Q.7 Electron flow in Cytochrome oxidase in the respiratory chain can be blocked by
(A) Rotenone (B) Amytal
(C) Cyanide (D) Cycloheximide
- Q.8 In case of humans, passive immunity observed in newborn child is due to the passage of the following immunoglobulin from the mother to the child through placenta
(A) IgD (B) IgE
(C) IgM (D) IgG

Q.9 In eukaryotic cells, around 5% cytosine residues are methylated, the methylation most commonly occurs in the following sequence

- | | |
|---------|---------|
| (A) CpA | (B) CpT |
| (C) CpG | (D) CpC |

Q.10 The following reagent will NOT release the integral proteins from the plasma membrane

- | | |
|-----------------------------|------------------|
| (A) Sodium chloride | (B) Triton X-100 |
| (C) Sodium dodecyl sulphate | (D) NP-40 |

Q.11-30 carry two marks each

Q.11 The biochemical reactions leading from glucose to the generation of glyceraldehyde-3-phosphate consume ATP. The number of ATP molecules consumed for the conversion of one molecule of glucose to glyceraldehyde-3-phosphate is

- | | |
|-------|-------|
| (A) 2 | (B) 1 |
| (C) 3 | (D) 4 |

Q.12 Monoclonal antibodies were raised against three different proteins containing unique epitopes. All the monoclonal antibodies were mixed together and placed in one of the wells in an Ouchterlony Double Diffusion plate. Similarly all three proteins were mixed together and placed in the adjacent well. The number of precipitin bands observed after incubation are

- | | |
|-------|-------|
| (A) 3 | (B) 2 |
| (C) 1 | (D) 0 |

Q.13 L-19 RNA from the protozoan *Tetrahymena* was demonstrated to have two enzymatic activities and these activities are

- (A) RNA polymerase, DNA polymerase
(B) Ribonuclease, RNA polymerase
(C) Ribonuclease, Deoxyribonuclease
(D) Ribonuclease, Protease

Q.14 A single stranded DNA of unknown size can NOT be distinguished from a double stranded DNA by

- (A) Analysis of base composition
(B) Thermal denaturation
(C) Density gradient ultracentrifugation
(D) Gel Electrophoresis

- Q.15 Telomerase is an enzyme whose macromolecular composition is
- Lipoprotein only
 - Ribonucleoprotein only
 - Ribonucleic acid only
 - Protein only
- Q.16 The molecular weight of IgG-Antigen complex at antigen excess is 300Kd. The molecular weight of antigen is
- 75
 - 50
 - 100
 - 150
- Q.17 The net reaction of the Citric acid cycle is
- $$\text{Acetyl CoA} + 2\text{NAD}^+ + \text{FAD} + \text{GDP} + \text{P}_i + 2\text{H}_2\text{O} \longrightarrow 2\text{CO}_2 + 2\text{NADH} + \text{FADH}_2 + \text{GTP} + 2\text{H}^+ + \text{CoA}$$
 - $$\text{Acetyl CoA} + 3\text{NAD}^+ + \text{FAD} + \text{GDP} + \text{P}_i + 2\text{H}_2\text{O} \longrightarrow 2\text{CO}_2 + 3\text{NADH} + \text{FADH}_2 + \text{GTP} + 2\text{H}^+ + \text{CoA}$$
 - $$\text{Acetyl CoA} + 2\text{NAD}^+ + 2\text{FAD} + 2\text{GDP} + 2\text{P}_i + 2\text{H}_2\text{O} \longrightarrow 2\text{CO}_2 + 2\text{NADH} + 2\text{FADH}_2 + 2\text{GTP} + \text{CoA}$$
 - $$\text{Acetyl CoA} + 4\text{NAD}^+ + \text{FAD} + \text{GDP} + \text{P}_i + \text{H}_2\text{O} \longrightarrow 2\text{CO}_2 + \text{NADH} + \text{FADH}_2 + \text{GTP} + \text{CoA}$$
- Q.18 Genetic variation between individuals within a species involving different alleles at a locus is called
- Isotypic variation
 - Idiotypic variation
 - Allotypic variation
 - Haplotypic variation
- Q.19 A pentameric IgM molecule was electrophoresed on a reducing SDS-Polyacrylamide gel. How many bands one can expect
- 1
 - 2
 - 3
 - 4
- Q.20 Viral encoded Ras oncogene transforms normal mammalian cells into cancer cells. Viral Ras protein differs from its normal counterpart by
- Diminished GTPase activity
 - Increased GTPase activity
 - Diminished ATPase activity
 - Increased ATPase activity

Q.21 Choose the correct match

Group I		Group II	
P	Immunodeficiency disease	1	Hexosaminidase-A
Q	Tay-Sach disease	2	Hypoxanthine-guanine phosphoribosyl-transferase
R	Lesch-Nyhan syndrome	3	Chloride channel
S	Cystic fibrosis	4	Adenosine deaminase
(A)	(B)	(C)	(D)
P-1	P-3	P-4	P-2
Q-3	Q-2	Q-1	Q-4
R-4	R-4	R-2	R-3
S-2	S-1	S-3	S-1

Q.22 Choose the correct match

Group I		Group II	
P	β -ketoacyl-ACP synthase	1	Reduces double bond forming saturated acyl-ACP
Q	β -ketoacyl-ACP reductase	2	Reduces β -keto group to β -hydroxy group
R	Enoyl-ACP-reductase	3	Condenses acyl and malonyl groups
S	Acyl carrier protein (ACP)	4	Carries acyl group in thioester linkages
(A)	(B)	(C)	(D)
P-2	P-3	P-4	P-3
Q-1	Q-2	Q-1	Q-1
R-3	R-1	R-2	R-2
S-4	S-4	S-3	S-4

Q.23 A DNA was labeled at its 5' end using γ ^{32}P -ATP. Choose the correct combination from the following options to separate the free γ ^{32}P -ATP from γ ^{32}P labeled DNA

P. γ ^{32}P -ATP can be removed by treating the sample with phosphatases.

Q. The labeled samples can be electrophoresed and blotted onto nitrocellulose membrane and then labeled DNA can be recovered from nitrocellulose membrane

R. Sample can be passed through a gel filtration column to separate free γ ^{32}P -ATP

S. DNA can be precipitated using ethanol to separate it from contaminating γ ^{32}P -ATP

(A) P, Q

(B) P, S

(C) R, S

(D) R, Q

Q.24 A team of researchers had used the following eluting buffers to prepare an anti albumin IgG from an anti IgG affinity column,

Buffer A: 0.1M Glycine-HCl, pH 3.0

Buffer B: 0.1M Sodium acetate, pH 6.0

Buffer C: 0.1M Sodium phosphate, pH 7.0

Buffer D: 0.1M Tris-HCl, pH 8.0

Which of the above buffers can be used for anti albumin IgG elution?

(A) Buffer A

(B) Buffer B

(C) Buffer C

(D) Buffer D

Q.25 Oligosaccharide chain is added to the Asparagine residue of a newly synthesized protein on the luminal side of the endoplasmic reticulum membrane. The Asparagine of the newly synthesized protein that is linked to oligosaccharide chain is a part of the sequence (x, can be any amino acid other than Proline)

(A) Asn-x-Asp

(B) Asn-x-Thr

(C) Asn-x-Ile

(D) Asn-x-Gly

Q.26 The 'Signal recognition particle' binds to the signal peptide of the protein undergoing synthesis resulting into a pause in the transnational process. The pause in the transnational phenomenon is due to

(A) inactivation of aminoacyl-tRNA synthetases

(B) inhibits the activity of elongation factor Tu

(C) induced conformational change in the smaller ribosomal subunit

(D) blockade of the entry of the next aminoacyl-tRNA for the reaction

- Q.27 Which of the following Statement is **NOT** true with respect to the Photosystem II found in the chloroplasts? (Photosystem I = PS I, Photosystem II = PS II)
- (A) PS II is located in the grana
 - (B) Chlorophyll molecule in the reaction center for the PS II is bound to a 110Kd integral membrane protein
 - (C) A complex of Cytochromes *b* and *f* transports electrons from PS II to PS I
 - (D) PS II reaction center is bound to two Mn^{2+} ions
- Q.28 Choose the statement that is **NOT** correct with respect to the Protein Kinase C (PKC)
- (A) Activated PKC can phosphorylate the specific tryptophan residue on the target protein
 - (B) PKC is a Ca^{2+} dependant kinase
 - (C) PKC can be activated by diacylglycerol
 - (D) Activation of PKC can lead to the activation of MAP kinase
- Q.29 'Enhancer' elements are known to increase the rate of transcription when present at the upstream side of the promoter sequences. If the same enhancer element is placed in reverse orientation,
- (A) the rate of transcription increases
 - (B) the rate of transcription decreases
 - (C) the rate of transcription remains same
 - (D) no transcription is observed
- Q.30 Choose the group containing only the peptide hormones
- (A) Vasopressin, Oxytocin, Epinephrine
 - (B) Vasopressin, Testosterone, Glucagon
 - (C) Oxytocin, Vasopressin, Thyroxine
 - (D) Oxytocin, Vasopressin, Somatostatin

End of Section I

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