2017

BIOCHEMISTRY — HONOURS

Sixth Paper

(Module – XI)

Full Marks – 50

The figures in the margin indicate full marks

Candidates are required to give their answers in their own words as far as practicable

Answer ***Question No. 1*** and ***any two*** taking ***one*** from each of the **Unit I** and **Unit II**

1. Answer the following questions (***any ten***) : 2×10

(a) What are adjuvants? Name one adjuvant used for human.

(b) What is the difference between a Nonsense and a Missense mutation?

(c) What is 'Rhogam'? How does it function?

(d) What are the two basic differences between prokaryote and eukaryote mRNA?

(e) What is an attenuated vaccine? Give one example.

(f) What are Okazaki Fragments?

(g) Name two professional antigen presenting cell (APC).

(h) Distinguish between selectable marker and reporter gene.

(i) Why HAT is used in the preparation of monoclonal antibody?

(j) What is the function of tRNA?

(k) IgM functions more effectively than IgG in bacterial agglutination — Explain why.

(l) Explain what do you mean by catabolite repression.

(m) What is anaphylatoxin? Give one example.

(n) Give one example of type II restriction enzyme indicating the restriction site.

(o) What is meant by Cap and tail of mRNA?

Unit – I

2. (a) What is the difference between allotype and idiotype determinants?

(b) If you treat IgG with papain, pepsin and β mercaptoethanol separately what fragments will be produced in each case?

(c) What is the principle of 'Passive agglutination' and 'Agglutination inhibition' test?

(d) Describe briefly the difference between 'Classical' and 'Alternative' pathway of complement activation. Why Gram-positive bacteria are generally resistant to complement mediated lysis?

(e) Where are the hypervariable regions located on an antibody molecule and what are their function?

(f) What do you understand by 'Serum sickness'? Which type of hypersensitivity reaction is associated with it? 2+(1+1+1)+(1+1)+(2+1)+(1+1)+(2+1)

3. (a) Is it possible to perform 'Ouchterlony Assay' using a Fab fragment as the antibody? Explain.

(b) Give one example of each of primary and secondary lymphoid organ in human. What is hematopoesis?

(c) What are the biological functions of IgG?

(d) Indicate which type(s) of hypersensitivity reactions (I – IV) apply to the following characteristics :

(i) Occurs as a result of mismatch blood transfusion.

(ii) Can lead to symptoms of asthma.

(iii) Can be induced by pollens in a sensitive individual.

(iv) Hemolytic disease 'erythroblastosis fetalis'.

(e) What is a toxoid? Which microorganism is used to prepare the BCG vaccine? What are the advantages and disadvantages of Sabin polio vaccine compared to Salk vaccine?

(f) Distinguish between primary and secondary immune response.

$2+(2+1)+2+(\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2})+(1+1+2)+2$

Unit – II

4. (a) Describe the experimental procedure and result which lead to the conclusion that DNA replication occur in semiconservative mode. Why does initiation of DNA synthesis require a primer?

(b) Why do you think Genetic information is stored in DNA and not in RNA?

(c) What is lac operon? What are the different protein encoded by lac operon gene? Why IPTG is used as an inducer of lac operon in experiment?

(d) What is SOS repair system? Why is it not regarded as a real repair process? Which base in DNA is termed as 'hot spot' for spontaneous mutagenesis?

(e) Describe briefly how cDNA libraries can be constructed. (Schematic presentation only)

(f) How does the *trp* repressor control gene expression?

$(2\frac{1}{2}+1)+1\frac{1}{2}+(1+1+1)+(1+1+1)+2+2$

5. (a) Briefly state the functions of following enzymes :

(i) Helicases (ii) Topoisomerase (iii) Reverse transcriptase (iv) DNA polymerase.

(b) Discuss briefly the mechanism of intrinsic and rho dependent termination of RNA synthesis.

(c) What is meant by a pseudo gene?

(d) What is catabolite repression and how does it work?

(e) If the sequence for the codon of an amino acid is 3′ UCG 5′ what is the sequence of the anticodon in the corresponding tRNA?

(f) A 8.0 kb DNA fragment has been inserted into the plasmid pBR 322 at Eco RI site. The recombinant plasmid is cut with Eco RI, Hind III and (EcoRI + Hind III) separately. The fragments obtained from these cut following electrophoresis on agarose gels are as follows :

Eco RI	:	8.0 and 6.0 kb
Hind III	:	5.5, 4.5 and 4.0 kb
EcoRI + Hind III	:	4.0, 3.5, 3.0, 2.5 and 1.0 kb

(i) Draw the restriction map of the recombinant plasmid

(ii) If a Southern blot is prepared from the gel which fragment(s) will hybridize to a probe of pBR plasmid DNA.

$(1\times4)+(1\frac{1}{2}+1\frac{1}{2})+1\frac{1}{2}+2\frac{1}{2}+1+(2+1)$