M.Sc. (Biotechnology) Examination, 2019

Microbial Biotechnology

Paper - 2/4A

Time : Four hours Full Marks : 100

PART - I

Answer question *1* and ***four*** from the rest

4+16×4=68

1. Answer ***any four*** 1×4

   a) Name the method by which it is possible to introduce correct version of the defective gene in all cells of the individual is achieved ?

   b) What is the major risk of gene therapy for reconstitution of immune deficiency in T cells ?

   c) Havard mouse is also known as .....

   d) Name the methods which can be used to detect a large deletion in he chromosome ?

   e) Name two major systems that have been successfully used in transgenic mice for inducible expression of transgene.

   f) Why it is preferred to produce recombinant 1L-2 in mammalian cells rather than E.Coli ?

2. a) What does chromosome painting allow ? Outline the protocol to paint human chromosome ? What are the characteristics of the probes ? 3+5+2

   b) What is PNA probes ? How flow fish with Telomere PNA probes are used for the measurement of telomere length in vertebrate hematopoietic cells by flow cytometry. 2+4

3. a) Why using traditional technology vaccination against Herpes Simplex virus is not suitable ? How this was solved ? 3+3

   b) What ar the advantage of genetic immunization ? How Shigella flexneri cab used for genetic immunication ?2+4

   c) Describe the strategy to develop attenuated vaccines against Salmonella Sp. 4

4. a) What are the advantage of DNA based diagnosis compared to conventional and antibody based detection method of Malaria ? 4+4

   b) What is meant by the term Variable Number Tandem Repeat ? How this is used in DNA finger printing ? Why is genetic fingerprinting useful in medical diagnosis, Give one example ? 2+3+3

5. a) Give some examples of therapeutic protein which are isolated using recombinant DNA technology and now

   being used for the treatment of some diseases. How therapeutic potential of Intereron can be enhanced using rDNA technology ? 4+4

   b) Outline the strategy by which Aliginate lyase can be isolated from Flavobacterium Sp. for the treatment of Cystic fibrosis. 4

   c) How targeted therapy can be developed for the treatment of coronary artery blockage ? 4

6. a) Why mammary gland of transgenic animals is generallyuse for the production of therapeutic agents. 5

   b) How stem cells are engineered to make specific transgenic animals. Why it is beneficial to use inducible promoter in transgenic animals ? 6+5

7. Write short notes on ***any two*** : 8×2

   a) Development of packaging cell lines

   b) Adeno associated virus for gene delivery

   c) Prodrug activation therapy

   d) Non viral gene delivery

PART - II

Answer ***any two*** questions (16 marks each)

8. a) i) What are Polyene Antibiotics ? 1

   ii) Name one such antibiotic. 1

   iii) Mention the mode of action of this type of antibiotic. 4

   b) Describe how lonizing radiation is used in killing microorganisms. 4

   c) Why is it important to identify as many cases associated with an outbreak as possible ? 2

   d) List any four points that need to be considered while selecting a germicidal Chemical. 4

9. a) A scientist needs to work with agents that can cause severe to fatal disease in humans for which vaccines or other treatments are available.

   i) At what biosafety level laboratory is he going to work? 1

   ii) What protective measures does he need to take ? 2

   iii) Name two diseases that fall in this category. 2

   iv) Mention three facility features of such a biosafety level. 3

   b) What are the ideal characteristics of a biological agent to be used as a weapon. 2

   c) Why is *Bacillus anthracis* considered as an effective biological agent. 2

   d) *Mycobacterium tuberculosis* cannot be killed by the method of desiccation. Explain why. 2

   e) What is disease burden. 2

10. a) Mucopolysaccharidoses are part of the lysosomal storage disease.

   i) When is this disease triggered. 2

   ii) How is lysosome important in this regard. 2

   iii) How many types of this disease is known to exist. 1

   b) What is Bio-Pen ? Where is it used. 2

   c) What is Primary and Secondary containment ? 2

   d) What are the changes that may occur in an infectious agent that may trigger an epidemic ? 2

   e) Why are most gram negative bacteria resistant to the actions of penicillin ? 2

   f) What are R plasmids ? How are they different from regular plasmids ? 3

11. a) You are given an overnight grown bacterial culture and several tubes each containing Penicillin, Streptomycin, Chloramphenicol, Ampicillin, Cephalosporin and Erythromycin. Describe how you would determine the sensitivity of the bacteria to these antibiotics. 4

b) A person is suffering from Tarui's disease. 1

i) What is the enzyme deficiency responsible for the disease. 1

ii) State two symptoms of such a patient. 2

c) A pharmaceutical compay showed the following in an article : "1500 subjects with a cold were treated with our new medicine. Within three days, 95% were asymptomatic and this result was statistically significant." The company claims the new medicine was effective. Is this conclusion justified ? Choose the right option. 1

i) Yes, because the effect was very large (95% of the subjects benefitted from treatment).

ii) No, because statistical significance indicates that the null hypothesis ("no effect") was correct.

iii) No, because no control group was involved in the study.

iv) Yes, because no control group was involved in the study.

d) What is Entomological Warfare (EW) Describe the different EW varieties. 4

e) How is Oxygen useful in killing microorganisms. 2

f) What is meant by selective toxicity ? 2