63/2 (SEM-4) ZOO 403 (C,F,W)

2023

ZOOLOGY

(Theory Paper)

Paper Code : ZOO 403 (C)

(Molecular Immunology)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks
for the questions.

1. Answer the following multiple choice type questions (*all* compulsory) : 1×6=6

   (a) In thymus-dependent antigen-activated T-cell, which among these properties will be seen ?

   (i) Affinity maturation

   (ii) Isotype switching

   (iii) Immunological memory

   (iv) Polyclonal activation

[Turn over

(b) Kappa and Lambda light-chain genes,

    (i) are located on the same chromosome

    (ii) associate with only one type of heavy chain

    (iii) can be expressed by the same B cell

    (iv) undergo separate splicing

(c) The mechanism that permits immunoglobulins to be synthesized in either a membrane bound or secreted form is

    (i) Allelic exclusion

    (ii) Class switching

    (iii) Differential RNA processing

    (iv) the one-turn/two-turn rule

(d) The TH_1 subset cell development is favoured in the presence of the following cytokine.

    (i) 1L-4

    (ii) 1L-6

    (iii) 1L-10

    (iv) 1L-12

(e) Which among these sub-classes of 1gG is not capable of activating complement at all

    (i) 1gG4   (ii) 1gG3

    (iii) 1gG2   (iv) 1gG1

(f) Which of the following cytoplasmic tail of T-cell co-receptor is required for phosphorylation of ITAM present in CD3 molecules ?

    (i) LCK   (ii) LAD

    (iii) LAT   (iv) ZAP 70.

2. Answer the following very short type questions (*all* compalsory) :   2×5=10

(a) Define allotype and idiotype immunoglobulin.

(b) What are the functions of secondary lymphoid organ in the immune system.

(c) Define Autoimmunity.

(d) What are the terms 'clonal selection' and 'clonal expansion' refer to concerning B-lymphocytes ?

(e) What are the causes that lead to chronic rejection of the graft ?

3. Answer any *six* of the following short types questions : 5×6=30

(a) Explain why the presence of both IgM and IgD on the membrane of the same B cell does not violate the unispecificity inplied by Clonal selection theory.

(b) Briefly describe the similarities and differences among cytokines, growth factors and hormones.

(c) Write about the oxygen-dependent and oxygen-independent mechanism of killing ingested pathogens.

(d) Write about the different factors that regulate the assembly of Membrane-attack-Complex (MAC) formation.

(e) What are the advantages and disadvantages of using attenuated organisms as vaccines ?

(f) Describe the pathway of complement activation through the classical pathway.

(g) Describe the immune-complex mediated hypersensitivity.

(h) Distinguish between active and pasrive immunity.

(i) What type of immune response is mediated by the TH_2 subset ? What type of antigen challenge is likely to induce a TH_1 mediated response ? 3+2=5

4. Answer any *two* of the following descriptive / analytical type questions : 10×2=20

(a) How does MHC Class-I differ from Class-II molueules in terms of its structure and antigenic peptide ? Explain the pathway of processing and presentation of endogenous antigen by MHC Class-I. 4+6=10

(b) What are superantigens ? What are its types and properties ? How do they induce damage in host ? 2+4+4=10

(c) Draw the basic structure of the αβ T-cell receptor and compare it with the basic structure of membrane-bound immuno-globulin. 5+5=10

5. Answer any *one* of the following advanced-type questions : 14×1=14

(a) How does immune surveillance screen the infected cell ? What are the different types

of antigens found in tumor cells ? How does the tumor cell escape the immune surveillance and form cancer ?   4+5+5=14

(b) How does autoimmunity develop in an idividual ? What do you mean by central and peripheral tolerance ? Describe the symptorms and mechanism of any one auto immune disease.   3+5+6=14

(Theory Paper)

Paper : ZOO 403 (F)

(Culture and Nutrition of Fish)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following multiple-choice type questions.   1×6=6

   (a) Which of the following are generally found to have the capacity to form long chain HUFA from PUFA due to presence of desaturatase enzyme in them ?

   (i) Freshwater fishes (ii) Marine fishes

   (iii)Both (i) and (ii)   (iv) None of these

   (b) Which of the following is a floating aquatic weed ?

   (i) *Nymphaea*   (ii) *Pistia*

   (iii) *Hydrilla*   (iv) *Potamogeton*

(c) Which of the following helps in prevention of lipid peroxidation in fish ?

(i) Carotenoids   (ii) Tocopherols

(iii) Ascorbic acid   (iv) All of these

(d) When Faecal Energy (FE) is subtracted from Gross Energy (GE) content of a particular feed or feed ingredient, the result is called as

(i) Intake Energy (IE)

(ii) Digestible Energy (DE)

(iii) Faecal energy of metabolic origin (FmE)

(iv) Metabolisable energy (ME)

(e) Seasonal or perennial ponds or impoundments, where riverine conditions are simulated during the monsoon season and major carps bred for production of seeds in India are known as

(i) Bundhs

(ii) Happa

(iii) Breeding ponds

(iv) Grow-out ponds

(f) What is true about Biofloc Technology ?

(i) It is an environment friendly technology for closed aquaculture

(ii) Benefits of Biofloc technology are feed conversion ratio, water use efficiency, water quality and have a reduced sensitivity to light fluctuations.

(iii) High C/N ratio is the basic principle behind the heterotrophic growth in Biofloc technology systems.

(iv) All of the above.

2. Answer the following very short type of questions :
$2 \times 5 = 10$

(a) What is meant by 'Biocenose' and 'Trophic niche' of a fish ?   2

(b) What is Food Conversion Ratio (FCR) ? How is it calculated ? $1+1=2$

(c) What are single cell proteins ? Give one example.

(d) Write the role of any two vitamins in fish nutrition.

(e) Why is Metabolizable Energy (ME) much more difficult to determine for aquatic animals as compared to terrestrial animals ?

3. Answer any *six* of the following questions : 5×6=30

(a) What are 'live feed' in fish nutrition ? Why are they considered important for fish ? 2+3=5

(b) How can the digestibility of formulated fish feed be improved ? Formulate a diet containing 35% protein by weight, comprising of two ingredient Fish meal (65% protein) and Rice bran (8% protein) using the Pearson's square method. Calculate the amount of each ingredient required for making 100 kg of the feed. 2+3=5

(c) Why do fish require less dietary energy compared to terrestrial animals ? What do you mean by 'enrichment' of live feed ? 3+2=5

(d) How is the growth of a fish affected if the P/E ratio is not optimum ? What are the factors affecting protein requirement of fish." 2+3=5

(e) What are the detrimental effects of aquatic weeds on a culture system ? Explain the biological control methods of aquatic weeds in aquaculture. 2+3=5

(f) What are Gross primary productivity and Net primary productivity ? Explain the various factors affecting pond productivity. 2+3=5

(g) Why are proteins considered the most important component in fish nutrition ? How can 'protein sparing effect' be achieved in fish nutrition ? 2+3=5

(h) Write the differences between Metabolizable Energy (ME) and Digestible Energy (DE). What will happen to the nutritional value of a diet when its DE (Digestible Energy) values closely approaches the GE (Gross Energy) values ? 2+3=5

(i) What are 'fish attractants' used in formulation of fish feed ? Write the role of pellet binders in fish feed. 2+3=5

4. Answer any *two* of the following long answer type questions : 10×2=20

(a) What are the major classes of feed ingredients ? Describe in detail the different components and their sources used in the preparation of artificial fish feed. 3+7=10

(b) What is the importance of water quality in aquaculture system ? Discuss the important water quality parameter essential for a good fish culture system.   4+6=10

(c) Write short notes on the following :   5+5=10

    (i)   Paddy cum Fish farming

    (ii) Monosex fish culture.

5. Answer any *one* of the following very long type questions :   14×1=14

(a) Explain the role of phytates and saponins as anti-nutritional factors in fish feed by taking examples. Describe the various types of microbial toxins and antimetabolites which effects fish feed. Add a note on their control and prevention.   5+6+3=14

(b) What are the criteria for species selection of aquaculture ? Elaborate the steps in the preparation of a fish farm. Describe in detail the culture of carps.   4+5+5=14

(Theory Paper)

Paper : ZOO 403 (W)

(Applied Wildlife Science)

Full Marks – 80

Pass Marks – 32

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Multiple choice questions (*All* six questions are compulsory) :   1×6=6

(a) Vector data are represented by

    (i)   Pixels

    (ii) Points

    (iii) Polygon

    (iv) Both (ii) and (iii)

(b) Tiger is a

    (i)   Flagship animal

    (ii) Keystone animal

    (iii) Both (i) and (ii)

    (iv) None of these

(c) Which among the following is not a criterion to be qualified for IBA ?

   (i) Sites having globally threatened bird species

   (ii) Sites having restricted range bird species

   (iii) Sites having large congregations of birds

   (iv) Sites having large avian diversity

(d) What is the primary purpose of an Environmental Impact Assessment (EIA) ?

   (i) To determine the economic viability of a project

   (ii) To evaluate the potential environmental impacts of a project

   (iii) To assess the social impacts of a project

   (iv) To evaluate the technical feasibility of a project

(e) What is the primary objective of BNHS ?

   (i) To promote wildlife tourism in India

   (ii) To conserve and study biodiversity in India

   (iii) To provide veterinary services to animals

   (iv) To train personnel for the Indian Forest Service.

(f) What stands for PTT ?

   (i) Platform Terminal Transmitter

   (ii) Platform Terminal Tracker

   (iii) Platform Temporal Transmitter

   (iv) Platform Telemetry Transmitter.

2. Very short type of questions (All *five* questions are compulsory)   2×5=10

   (a) What do you mean by Morphometry ?

   (b) What is the difference between endangered and a critically endangered criteria of IUCN ?

   (c) Differentiate between GIS and GPS.

   (d) Write two criteria for the qualification of Community Conserved Area.

   (e) Give two suggestions to mitigate human-monkey conflict.

3. Short type questions (any *six* out of nine questions)   5×6=30

   (a) What do you understand by inbreeding depression in Conservation Biology ?

(b) Write a short note on the Tiger Reserves in India.

(c) Write briefly about the TRAFFIC.

(d) Describe how DNA sequencing help in species identification.

(e) Write importance of home garden in conservation of biodiversity.

(f) Write prospects of wildlife tourism in Bodoland Territorial Region.

(g) How does EIA affect wildlife conservation ?

(h) How does feather analysis help in bird identification ?

(i) What is the role of molecular marker in Wildlife Forensics ?

4. Descriptive type questions (any *two*) : 10×2=20

(a) Describe the IUCN Red List and its role in global conservation efforts. In your answer, discuss the criteria used to assess the conservation status of species. 3+7=10

(b) Explain the Wildlife Protection Act of 1972 and its significance in the conservation of wildlife in India. Discuss the key provisions of the Act. 3+7=10

(c) Write about the Bander's code of ethics. Why is bird banding important ? 5+5=10

5. Advanced answer type questions (any *one*) :
14×1=14

(a) How does poaching constitute wildlife crime ? How does it specifically threaten rhinos in North East India ? What measures can be implemented to reduce poaching of rhino ? 3+7+4=14

(b) What is camera trapping ? Explain the statistical frameworks used in camera trapping method. 4+10=14