

ZOOLOGY SYLLABUS FOR VI SEMESTER

W.E.F. 2017-18

ZOOLOGY –ELECTIVE PAPER:VII-(A)

IMMUNOLOGY

Periods:60

Max. Marks:100

Unit - I

1.1 Overview of Immune system

- 1.1.1 Introduction to basic concepts in Immunology
- 1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system

- 1.2.1 Cells of immune system
- 1.2.2 Organs of immune system

Unit - II

2.1 Antigens

- 2.1.1 Basic properties of antigens
- 2.1.2 B and T cell epitopes, haptens and adjuvants
- 2.1.3 Factors influencing immunogenicity

Unit - III

3.1 Antibodies

- 3.1.1 Structure of antibody
- 3.1.2 Classes and functions of antibodies
- 3.1.3 Monoclonal antibodies

Unit - IV

4.1 Working of Immune system

- 4.1.1 Structure and functions of major histocompatibility complexes
- 4.1.2 Exogenous and Endogenous pathways of antigen presentation and processing

Unit - V

5.1 Immune system in health and disease

- 5.1.1 Classification and brief description of various types of hyper sensitivities

5.2 Vaccines

- 5.2.1 General introduction to vaccines
- 5.2.2 Types of vaccines

ZOOLOGY PRACTICAL SYLLABUS FOR VI SEMESTER

ZOOLOGY - ELECTIVE PAPER – VII-(A)

IMMUNOLOGY

Periods: 24

Max. Marks: 50

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

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**ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
VI SEMESTER**

AQUACULTURE

Cluster Elective Paper: VIII-B-1

PRINCIPLES OF AQUACULTURE

Periods:60

Max.Marks:75

Unit – I

1.1 Introduction / Basics of Aquaculture

- 1.1.1 Definition, Significance and History of Aquaculture
- 1.1.2 Present status of Aquaculture – Global and National scenario
- 1.1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.

Unit – II

2.1 Types of Aquaculture

- 2.1.1 Freshwater, Brackishwater and Marine
- 2.1.2 Concept of Monoculture, Polyculture, Composite culture.

2.2 Culture systems

- 2.2.1 Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems

2.3 Culture practices

- 2.3.1 Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.

Unit – III

3.1 Design and construction of aquafarms

- 3.1.1 Criteria for the selection of site for freshwater and brackish water pond farms
- 3.1.2 Design and construction of fish and shrimp farms

3.2 Seed resources

- 3.2.1 Natural seed resources and Procurement of seed for stocking: Carp and shrimp

3.3 Nutrition and feeds

3.3.1 Nutritional requirements of a cultivable fish and shellfish

Unit – IV

4.1 Management of carp culture ponds

4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting of ponds

4.2 Culture of giant freshwater prawn, *Macrobrachium rosenbergii*

Unit – V

5.1 Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*)

5.2 Culture of seaweeds-species cultured, culture techniques, important by-products, prospects

5.3 Culture of ornamental fishes – Setting up and maintenance of aquarium; and breeding.

REFERENCES BOOKS

1. Bardach, JE *et al.* 1972. *Aquaculture – The farming and husbandry of freshwater and marine organisms*, John Wiley & Sons, New York.
2. Bose AN *et al.* 1991. *Coastal aquaculture Engineering*. Oxford & IBH Publ.Co.Pvt.Ltd.
3. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn*. Daya Publ. House.
4. FAO. 2007. *Manual on Freshwater Prawn Farming*.
5. Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
6. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
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9. Landau M. 1992. *Introduction to Aquaculture*. John Wiley & Sons.
10. Lovell RT. 1998. *Nutrition and Feeding of fishes*. Chapman & Hall.
11. Mcvey JP. 1983. *Handbook of Mariculture*. CRC Press.
12. MPEDA: *Handbooks on culture of carp, shrimp, etc.*
13. New MB. 2000. *Freshwater Prawn Farming*. CRC Publ.
14. Pillay TVR. 1990. *Aquaculture- Principles and Practices*, Fishing News Books Ltd., London.
15. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
16. Rath RK. 2000. *Freshwater Aquaculture*. Scientific Publ.
14. Stickney RR. 1979. *Principles of Warmwater Fish Culture*, John Wiley & Sons
15. Wheaton FW. 1977. *Aquacultural Engineering*. John Wiley & Sons.

CLUSTER ELECTIVE PAPER: VIII-B-2

AQUACULTURE MANAGEMENT

Periods : 60

Max.Marks : 75

Unit – I

1.1 Breeding and Hatchery Management

- 1.1.1 Bundh Breeding and Induced breeding of carp by Hypophysation; and use of synthetic hormones
- 1.1.2 Types of fish hatcheries; Hatchery management of Indian major carps
- 1.1.3 Breeding and Hatchery management of *Penaeus monodon*/ *Litopenaeus vannamei*
- 1.1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management

- 2.1.1 Water quality and soil characteristics suitable for fish and shrimp culture
- 2.1.2 Identification of oxygen depletion problems and control mechanisms in culture ponds
- 2.1.3 Aeration: Principles of aeration and Emergency aeration

Unit – III

3.1 Feed Management

- 3.1.1 Live Foods and their role in shrimp larval nutrition.
- 3.1.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics.
- 3.1.3 Feed formulation and manufacturing; Feed storage

Unit – IV

4.1 Disease Management

- 4.1.1 Principles of disease diagnosis and health management;
- 4.1.2 Prophylaxis, Hygiene and Therapy of fish diseases
- 4.1.3 Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

Unit – V

5.1 Economics and Marketing

- 5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis
- 5.1.2 Fish marketing methods in India; Basic concepts in demand and price analysis

5.2 Fisheries Extension

- 5.1.3 Fisheries Training and Education in India; Role of extension in community development.

REFERENCE BOOKS

1. Boyd CE. 1979. *Water Quality in Warm Water Fish Ponds*. Auburn University
2. Boyd, CE. 1982. *Water Quality Management for Pond Fish Culture*. Elsevier Sci. Publ. Co.
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CLUSTER ELECTIVE PAPER: VIII-B-3

POSTHARVEST TECHNOLOGY

Periods : 60

Max.Marks : 75

Unit – I

1.1 Handling and Principles of fish Preservation

- 1.1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.
- 1.1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.

Unit – II

2.1 Methods of fish Preservation

- 2.1.1 Traditional methods - sun drying, salt curing, pickling and smoking.
- 2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

3.1 Processing and preservation of fish and fish by-products

- 3.1.1 Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.
- 3.1.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.2 Seaweed Products

- 3.2.1 Preparation of agar, algin and carrageen. Use of seaweeds as food for human consumption, in disease treatment and preparation of therapeutic drugs.

Unit – IV

4.1 Sanitation and Quality control

- 4.2.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

Unit – V

5.1 Quality Assurance, Management and Certification

- 5.1.1 Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

REFERENCE BOOKS

1. Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.
2. Bond, et al. 1971. *Fish Inspection and Quality Control*. Fishing News Books, England.
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ZOOLOGY PRACTICAL SYLLABUS CLUSTER ELECTIVE PAPER: VIII-B
VI SEMESTER

PRINCIPLES OF AQUACULTURE

PRACTICAL: I

Periods : 24

Max.Marks : 50

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample; Estimation of dissolved oxygen, free carbondioxide, total alkalinity, total hardness, phosphates and nitrites.
2. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Each 5

**ZOOLOGY PRACTICAL SYLLABUS CLUSTER ELECTIVE PAPER: VIII-B
VI SEMESTER**

AQUACULTURE MANAGEMENT

PRACTICAL - II

Periods :24

Max.Marks : 50

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

ZOOLOGY PRACTICAL SYLLABUS CLUSTER ELECTIVE PAPER: VIII-B

VI SEMESTER

PRACTICAL – III

PROJECT WORK

Visit to a fish breeding centre / fish farms and submit a project report

or

Visit to a feed manufacturing unit and submit a project report

or

Visit to a shrimp hatchery / shrimp farms and submit a project report

or

Visit to a shrimp processing unit and submit a project report

ZOOLOGY - VI SEMESTER.
Elective Paper : VII (A)

IMMUNOLOGY.

Time : 3hr.

Max. Marks: 75

I. Answer any five of the following:

5×5 = 25

1. Innate Immunity - సహజ అసంక్రమ్యత
2. Haptenes - ~~ప్రోటెన్~~ హాప్టెన్లు
3. Features of IgG - IgG స్వభావము.
4. Cytokines - సైటోకైన్లు.
5. Anaphylaxis - అనాఫిలాక్సిస్
6. phagocytosis. - భక్షకక్రియా
7. Vaccines - వ్యాక్సిన్లు.

II. Answer any five of the following.

5×10 = 50.

Draw labelled diagrams wherever necessary.

9. (a) What is Immunity? Explain different types of Immunity.
అసంక్రమ్యత అనగా నేమి? అసంక్రమ్యతలలోని వివిధ రకములను వివరింపుము.

(or)

- (b) Write an essay on T and B lymphocytes and explain how they are useful in Immune response.

T మరియు B లింఫోసైట్లను గురించి వివరించి అసంక్రమ్య అనుక్రియలలో వాటి ఉపయోగములపై సరైన వివరణను వ్రాయుము.

- (10) (a) Describe organs of Immune system with functions.

అసంక్రమ్యత వ్యవస్థ కల అ.లింఫాాయిడ్ అవయవాలను వర్ణించి మరియు విధులను వివరింపుము.

(A)

⑤ Describe The factors influencing Immunogenicity.
కణ మధ్యకేంద్రములు ప్రభావితంచేయు కారకములను
వివరింపుము.

⑥ (a) Describe structure and classification of Antibodies.
ఐటీ రక్తముల నిర్మాణము మరియు వర్గీకరణను వివరింపుము.
(౧)

⑥ (b) Describe The properties and functions of Monoclonal Antibodies.
మోనోక్లోనల్ ఐటీ రక్తకముల లక్షణములను మరియు విధులను
వివరింపుము.

⑦ (a) Write an essay on HLA-typing and its importance.
'HLA టైపింగ్', అనగా నేమి? దాని ప్రాముఖ్యతను గురించి
వ్రాయుము.
(౧)

⑦ (b) Describe Exogenous and Endogenous pathways of Antigen presentation and processing.

ఐటీ నికరముల బహిర్గత మరియు అంతర్గత ప్రక్రియలను
మరియు బయటపడే విధానాన్ని వివరింపుము.

⑧ (a) Define Hypersensitivity. Write an essay on different types of Hypersensitivities.

హైపర్ సెన్సిటివిటీ అనగా నేమి? హైపర్ సెన్సిటివిటీ చరిత్రలను గురించి
ఒక వ్యాసమును వ్రాయుము. (౧)

⑧ (b) Enumerate The Concepts of Autoimmunity and Immunodeficiency.
స్వీకరణ అసంక్రమిత మరియు అసంక్రమిత రుగ్మతలను గురించి వ్రాయుము.

[Post-Chand Jernan] Signature 8/1/18

Time: 3hr.

Max Marks: 75

5×5=25

I. Answer any five of the following;
Draw labelled diagrams wherever necessary.

1. Significance of Aquaculture.
ఆకాశ్వాసన (పావనశిక్షణ) తలచుట.
2. Pen System - పెన్ సిస్టం పద్ధతి.
3. Site selection for fish pond farm.
చేపల పెంపకం నిర్మాణం స్థలం ఎంపిక.
4. Importance of Natural and Artificial food in fish culture.
చేపల పెంపకంలో సహజ మరియు కృత్రిమ ఆహారం ముఖ్యత.
పావనశిక్షణ.
5. Indian major Carps : భారతదేశపు ప్రధాన కార్ప్ చేపలు.
6. Ornamental fishes - అలంకరణకు ఉపయోగించే చేపలు.
7. Weed Control - కలుపు మొక్కల నియంత్రణ.
8. Intensive Culture - ఖింతకల్చర్.

5×10=50

II. Answer ALL of the following.

Draw labelled diagrams wherever necessary.

9. a) write an essay on present status of Aquaculture.
ఆకాశ్వాసన ముఖ్యత ప్రస్తుత స్థాయి/స్థితిపై ఒక వ్యాసం రాసండి.
[OR]
- b) write an account on major Cultivable species for fresh water Culture.
మంచినీటి వర్తనములో ప్రధానంగా పెంపకం చేసే వర్తన జాతుల గురించి వ్యాసం రాసండి.

10. a) write an essay on Composite fish Culture.
కంపోజిట్ చేపల పెంపకం పై ఒక వ్యాసం వ్రాయండి.
[OR]

b) Explain in detail the traditional and extensive culture practices of Shrimp.
తెప్పర చేపల అవలంబించు సాంప్రదాయ మరియు విస్తృత పద్ధతులను గురించి విపులంగా వివరింపుము.

11. a) write an essay on Seed resources of Carps.
కార్ప్ చేప ఉత్పత్తి వనరులపై ఒక వ్యాసం వ్రాయండి.
[OR]

b) Explain in detail the nutritional requirements of Cultivable Shell fish.
కర్చు చేపల పెంపకానికి అవసరం అయిన పోషక విధానం ను వివరింపుము.

12. a) write an essay on Stocking Management of ponds.
పెంపక చేరువుల నిల్పి నిర్వహణపై ఒక వ్యాసం వ్రాయండి.
[OR]

b) Explain Culture of Macrobrachium rosenbergii.
మాక్రోబ్రాకియం రోసెన్ బెర్గి పెంపకం ను వివరింపుము.

13. a) write an essay on pearl oyster Culture.
ముత్యేళ్ళు ఆర్కల్చర్ పెంపకం ను వివరింపుము.
(or)

b) write a note on Seaweed Culture techniques.
సముద్రపు (కలుపు) పొచి వర్గీకరించిన పద్ధతులను వివరింపుము.

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Time: 3 hrs.

Max. marks: 75

I. Answer any Five of the following.

5 × 5 = 25

Draw labelled diagrams wherever necessary.

1. Bundh breeding.
2. Synthetic Hormones.
3. Aeration.
4. Artificial Diet.
5. Feed Additives.
6. Fish immunization.
7. Cost benefit Analysis.
8. Cryopreservation.

II. Answer any Five of the following.

5 × 10 = 50

Draw labelled diagrams wherever necessary.

① Explain the steps involved in the Induced breeding.

ఉత్పత్తి చేయడానికి సంబంధించిన దశలు వివరించండి.

or.

② Describe the types of fish hatcheries.

వివిధ రకాల చేపల పోషకాలను వివరించండి.

③ Discuss the physical factors suitable for

culturing of Aquatic animals.

జలచర జీవుల పోషకాలను వివరించండి.

④ Write about the fertilizers commonly used in fish ponds.

చేపల పోషకాలను వివరించండి.

11) a) Describe The Supplementary feeds used in Shrimp Culture
కొమ్మలను కల్పక చీమలుకొరి కౌవలసన అదనపు ఆహారం
గురించి వివరింపుము. [OR]

~~b) write about The fertilizers~~

b) write an essay on feeding mechanisms.

ఆహారవిధానం గురించి ఓక వ్యాసమును వ్రాయుము

12) a) Explain The diseases occur in Culturing fishes.

చేపలకల్పక అంటు వ్యాధులను గురించి వివరింపుము.

[OR]

~~b) Explain The diseases occur in Culturing fishes.~~

b) Describe The common diseases in Shrimp during Culture.

కొమ్మల పెంకము అంటు వ్యాధులను వివరింపుము.

13) a) Explain fish marketing methods in India.

[OR]

చి: భారత దేశంలో చేపల మార్కెటింగ్ విధానాలను వర్ణింపుము.

[OR]

b) Describe The role of fisheries training and Education in India.

భారత దేశము అందు చేపలను గురించి అభ్యయనము
మరియు శిక్షణను వివరింపుము.

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Prumane
Bas-Chairperson.

ZOOLOGY - VI SEMESTER
CLUSTER Elective paper : VIII B-3.
POST HARVEST TECHNOLOGY

Time: 3hrs.

Max. marks: 75

5×5=25

I. Answer any five of the following.

1. Transport of fish - చేపల రవాణా
2. Denudation - డీస్కలడేషన్
3. Accelerated freeze drying - ఎక్స్ట్రెమైజ్డ్ ఫ్రీజ్ డ్రయింగ్
4. Ensilage - ఎన్సైలేజ్ విధానము.
5. Sea weeds - సముద్రపు కలుపు మొక్కలు
6. Preprocessing measures - ప్రాథమిక ప్రక్రియ కొలవడాలు.
7. Therapeutic Drugs - వేరెక్యు విధానముల వివరాలు.
8. Fish byproducts - Importance - చేపల ఇతర ఉత్పత్తులు - ప్రాముఖ్యత

II. Answer any five of the following.

9a) Discuss how the fish was handled during preservation.
చేపల నిల్వ-చేయుటలో ఎటువంటి మెరుగు పరికర పాటించబడినవి
మరియు సాంప్రదించబడినవి.
[OR]

9b) Describe the principles involved in fish preservation.
చేపల నిల్వ-చేయుటలో పాటించబడిన సూత్రములను వివరింపుము.

10a) Write about various traditional methods of fish preservation.
చేపలను నిల్వ చేయుటలో సాంప్రదాయ పద్ధతులను వివరింపుము
[OR]

10b) Explain the advanced methods of fish preservation.
చేపలను నిల్వ చేయుటలో అధునాతన పద్ధతులను వివరింపుము

(11) a) write an essay on fish byproducts.

పేదల నుండి లభ్యమయ్యే ఇతర ఉత్పన్నకాలను గురించి వ్యాసము
(వ్రాయుము). [OR]

b) Describe The products produced from Sea weeds.

సముద్రపు కలుపు మొక్కల నుండి ఉత్పత్తి అగు ఉత్పన్నకాలను
వివరింపుము.

(12) a) write about Sanitary measures in processing plants

మొక్కల ఎండు పరిశుభ్రత లు గాని మెరుగుచేయు వివరింపుము.

[OR]

b) Explain The regulatory affair in Industries.

పరిశ్రమల ఎండు క్రమబద్ధీకరణ విధానాన్ని వర్ణింపుము.

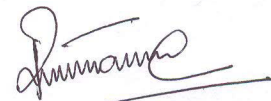
(13) a) Describe Various Quality Assurance and Systems in Sea food Safety.

సముద్రపు ఆహారం లు గాని వివిధ రికార్డులైన నాణ్యత పద్ధతులను
వారి రక్షణను గురించి వివరింపుము.

[OR]

b) what are National & International Standards in Quality Assurance.

నాణ్యత ప్రమాణాలను నిర్ధారించు ఖాతీయ మరియు
అంతర్జాతీయ విధానములను తెల్పుము.



8.1.18

[Bos - Chairperson]