



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Shri Vaishnav Institute of Science Department of Life Science B.Sc. (Major - Biotechnology)

### SEMESTER VI

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
<b>BSCBT601</b>	<b>Major</b>	<b>Immunology</b>	60	20	20	30	20	4	-	2	6

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

**\*Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

#### Course Objectives:

1. Knowledge of basics in Immunology.
2. Concepts of structure, functions and properties of: Immune Cells.
3. Study of Antigen and Antibody characteristics and interactions
4. Study of MHC and complement system
5. Study of Vaccines and Autoimmune disorders.

#### Course Outcomes:

1. Students will have a comprehensive idea about basics of Immunology
2. Understanding the basics of Antigen and Antibodies characteristics and interactions.
3. Understanding the basic of MHC and Complement system
4. Understanding the application of Immunology.

#### UNIT-I


Origin of Immunology, Concept of Innate and Adaptive immunity, Cell mediated and Humoral Immunity. Basic concept of cytokines. Primary and secondary immune response, Clonal selection of lymphocytes. Structure, Functions and Properties of: Immune Cells – Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell; and Immune Organs – Bone Marrow, Thymus, Lymph Node, Spleen, GALT and MALT.


#### UNIT-II

Characteristics of antigens (Foreignness, Molecular size and Heterogeneity), antigenicity, immunogenicity, hapten, epitopes, Adjuvant, T-dependent and T-independent antigen. Structure, Types, Functions and Properties of antibodies; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); VDJ rearrangements; Monoclonal, Polyclonal antibodies. Antibody mediated effector functions.


#### UNIT-III

Antigen - Antibody interactions: Principles of Precipitation and Agglutination. Precipitation reactions-Radial immune diffusion, double immune diffusion, immune electrophoresis; Agglutination reactions-Hemagglutination, passive agglutination, bacterial agglutination. ELISA, ELISPOT, Western blotting, Immuno fluorescence, Radio Immuno Assay.

  
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## Shri Vaishnav Institute of Science

### Department of Life Science

### B.Sc. (Major - Biotechnology)

### BSCBT601 Immunology

#### UNIT – IV

Structure and Functions of major histocompatibility complex MHC I & II molecules; Antigen processing and presentation (Cytosolic and Endocytic pathways). Complement components, function, complement activation- (i) Classical, (ii) Alternate and (iii) lectin pathways (characteristics & functions).

#### UNIT-V


Immune diseases: Hypersensitivity: definition, types, examples. Auto-Immune disease and Immuno-deficiencies with examples. Vaccines: Active and passive immunization (definition, characteristics, examples and functions). Attenuated and inactivated viral or bacterial vaccines (definition, characteristic, functions, examples).


#### List of Practicals:


1. Estimation of haemoglobin from blood sample.
2. Partial purification of IgG by ammonium sulphate fractionation and Dialysis.
3. Purification of IgG by column chromatography.
4. Serum separation and serological reactions (a) agglutination (b) precipitation.
5. Enzyme linked immune sorbent assay.
6. Isolation of lymphocytes from peripheral blood.
7. Ouchterlony double diffusion.
8. Single radial immune diffusion.
9. Rocket immune electrophoresis
10. Double diffusion, Immune-electrophoresis and Radial Immuno diffusion.

#### Books:

1. Brostoff, J., Seaddin, J. K., Male, D., & Roitt, I. M. (2002). Clinical Immunology. London. Gower. Medical Pub.
2. Goding J. W. (1996). ; Monoclonal Antibodies in Cell Biology, Biochemistry, and Immunology. London: Academic Press
3. Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. (2019). Kuby Immunology. New York: W.H. Freeman. 8th Edition
4. Murphy, K., Travers, P., Walport, M., & Janeway, C. (2012). Janeway's Immunobiology. New York: Garland Science.
5. Parham, P. (2005). The Immune System. New York: Garland Science.
6. Paul, W. E. (2012). Fundamental Immunology. New York: Raven Press.

  
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**SEMESTER VI**

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
<b>BSCBT602</b>	<b>DSE</b>	<b>Plant Growth Regulators and Plant Tissue Culture</b>	60	20	20	30	20	3	-	1	4

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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**Course Objectives:**

1. To have the knowledge of plant hormones and plant growth regulators
2. To know the applications of plant hormones and plant growth regulators in agriculture
3. To have the knowledge of methods of plant tissue culture
4. To know the applications of plant tissue culture.

**Course Outcomes:**


1. Student will be able to understand the biochemical nature of plant hormones and plant growth regulators
2. Student will understand the mechanism of action of plant hormones and their applications.
3. Student will be able to understand the methods of culturing plant tissue.
4. Student will be able to understand the plant tissue culture applications


**UNIT – I**


Phototropism and discovery of auxin. Types of auxins and their chemical structure. Physiological reactions regulated and mechanism of action of auxins. Gibberellins – discovery and chemical structure. Physiological reactions regulated by gibberellins. Synthesis of amylase and gene regulation by gibberellins.

**UNIT- II**

Cytokinins – synthetic and natural cytokinins. Physiological reactions regulated by cytokinins. Mechanism of action of cytokinins  
Abscisic acid – discovery and physiological reactions regulated. Role of abscisic acid under water stress.

  
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**BSCBT602 Plant Growth Regulators and Plant Tissue Culture**

**UNIT – III**

Ethylene – biosynthesis and physiological reactions regulated. Mechanism of action of ethylene. Natural and synthetic plant growth regulators.

Physiological effects of ascorbic acid, polyamines, oligosaccharides, brassinosteroids, phenolic compounds and strigolactones.

**UNIT -IV**


History of plant tissue culture. Preparation of media for plant tissue culture. Inorganic and organic nutrients in the media. Role of growth regulators in the media.


**UNIT – V**


Selection and maintenance of callus. Single cell culture, suspension cultures and batch cultures. Cyto differentiation, organogenic differentiation and somatic embryogenesis. Haploid plants – anther and ovary culture. Protoplast isolation and cybrids. Synthetic seeds. Introduction to transgenic plants and their advantages

**Practical**

1. Phototropism – dependence on wavelength of light.
2. Effect of auxin on the growth of coleoptile and stem internode
3. Effect of gibberellin on growth of dicot seedlings
4. Germination and activity of amylase in wheat and maize seeds
5. Effect of gibberellin on amylase activity in half seeds
6. Effect of kinetin on expansion growth of cotyledons
7. Effect of kinetin on senescence
8. Effect of kinetin on dark grown seedlings
9. Effect of abscisic acid on the growth of seedlings
10. Effect of abscisic acid on expansion of cotyledons
11. Effect of abscisic acid on amylase activity
12. Effect of ethenol on growth of seedlings
13. Media preparation and sterilization
14. Methods of surface sterilization
15. Micropropagation
16. Callus induction from root, stem, leaf
17. Somatic embryos
18. Organogenesis
19. Synthetic seeds
20. Seed germination in-vitro

  
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<b>BSCBT603</b>	<b>DSE</b>	<b>Animal Physiology</b>	60	20	20	30	20	3	-	1	4

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#### Course Objectives:

1. To study the morphology and physiology of mammals
2. To study the mechanism of digestive, muscular, and respiratory system of mammals
3. To know the endocrine gland, hormones, and their functions
4. To understand the biochemical mechanism of hormonal action

#### Course Outcome:

1. Students will be able to understand the structure and functions of various organs of mammals
2. Students will be able to understand the mechanism of digestive, muscular, and respiratory system of mammals
3. Student will know about endocrine glands and their functions
4. Student will understand the biochemical regulation of metabolism by hormones

#### UNIT-I


Digestive system of mammals: Secretory function of alimentary canal. Digestion and absorption of Carbohydrates, Lipids and Proteins. Excretory System of Mammals: Formation of urea (Ornithine cycle) and Urine (Glomerular filtration, Tubular secretion, and Selective re-absorption).


#### UNIT-II

Respiratory system of mammals: Mechanism of respiration, transport of oxygen and carbon dioxide by blood. Circulatory system of mammals: Course of blood circulation. Composition and functions of blood; blood clotting.


#### UNIT-III

Muscular system of mammals: Types, structure, and functions of muscles. Muscle contraction. Nervous system of mammals: Structure of nervous tissue. Mechanism of nerve impulse transmission

  
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### BSCBT603 Animal Physiology

#### UNIT-IV

Classification of Hormones: Biochemical nature of hormones. Mechanism of action- polar and nonpolar hormones. Effects of hormone interactions. Pheromones. Neuroendocrine regulation of immune system

#### UNIT-V

Endocrine glands: Introduction to endocrine system. Thyroid, Pituitary, Adrenal, Hypothalamus, Pancreas, Parathyroid, Pineal, Thymus, Gonads; Secreted Hormones with their regulations and disorders. Biological clock. Synthesis and regulation of melatonin. Role of pineal in circadian rhythms.

#### PRACTICAL:-

1) Histological slides and charts/models related to:

A] Digestive system, B] Excretory system, C] Respiratory system, D] Circulatory System  
E] Muscular system, F] Nervous system] Reproductive system,

2) Endocrinology glands

Histology Slides– Be able to identify the following tissues of endocrine glands.

A). Pituitary gland: anterior pituitary, posterior pituitary, Pituitary Gland,

B). Thyroid gland, Thyroid follicle, Colloid within follicle, Follicular cells,

C). Parathyroid glands- usually viewed in a tissue section including a section of the thyroid.

Parathyroid Gland

D) Pancreas:- Pancreatic Islet, Pancreas with Islet of Langerhans (Pancreatic Islet)

3) Haematological experiments:

A] Blood grouping B] Differential count of R.B.C and W.B.C.


C] Clotting time and Bleeding time D] Estimation of haemoglobin


3) Estimation of different hormones such as thyroid , pancreases, and parathyroid.


4) Estimation of glucose-by-Glucose oxidase (GOD) and Peroxidase (POD) method.


#### BOOKS:-

1. Chordate Zoology and Elements of Animal Physiology, By Jaurdan, E.L .and Verma, P.S., S. Chand & Company Ltd, New Delhi.
2. An Introduction to Embryology. Balinsky, B.I. Saunders Co. USA.
3. *Human reproductive and Developmental Biology*. Bagley, D.J, Frith, J.A .and Hoult, J.R.S. Mac Millan Press, London.
4. A textbook of Comparative Endocrinology. Gorbman, A and Bern, H.A.; Willy Estern, New Delhi
5. Clinical Rounds in Endocrinology, Anil Bhansali, Yashpal Gogate, Springer; 2015 edition
6. Textbook of Endocrinology, P R Yadav, Sonali Publications, 2009.

  
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