

Department of Biotechnology

Semester-VI

DSC8: 21BSC6C8BTL: Medical Biotechnology

Course Title: Medical Biotechnology	Course code: 21BSC6C13BTL
Total Contact Hours: 56 Hrs.	Course Credits: 04
Internal Assessment Marks: 40	Duration of SEE: 02 Hrs.
Semester End Examination Marks: 60	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Understanding the basics of genetic information responsible for disease development
2. Students will have a clear understanding of microbial diseases, host pathogen interactions, and the issues associated with drug-resistant microorganisms.
3. Students also comprehend the significance of normal flora associated with human health.
4. They will also learn about drug- Receptor interactions, drug toxicology and its pharmacological significance, conducting clinical trials, ethical issues in clinical research and a preliminary idea about artificial intelligence and personalized medicine as highly emerging areas in medical science.

DSC8: 21BSC6C8BTL: Medical Biotechnology

Unit	Description	Hours
1	Introduction, Microbial diseases & Diagnostics: Medical Biotechnology: Scope and Importance. Microbial diseases in humans: Mode of infection, symptoms, epidemiology and control measures of diseases caused by Viruses (AIDS, Hepatitis-B, Rabies) Bacteria (Typhoid, Cholera, TB, Plague), Fungi (Aspergillosis, Histoplasmosis), Protozoa (Malaria, Amoebiasis). Diagnostics: Applications of immunological and molecular diagnostic methods (RIA, ELISA, PCR, and DNA fingerprinting) in forensic science and disease diagnosis. Clinical proteomics - protein microarray for disease diagnosis. Ethics in molecular diagnosis.	11
2	Clinical research: Introduction to clinical research, history of clinical research, and an overview. Importance of Indian and global clinical research, Regulatory agencies. Scope of clinical research. ICH- GCP- History, objectives, structure, guidelines, and future of ICH. Different phases of clinical research. Ethical Issues in clinical research- Introduction, codes, declaration, and guidelines.	12
3	Nanobiotechnology: (Grinding – high energy ball milling), Physical Methods (Vapor deposition - pulsed laser deposition), Chemical methods (Sol-gel process, Combustion route), Green synthesis (plant and microbial extracts). Applications of nanotechnology: Nano biosensors, Bioremediation, drug and gene delivery,	11

	Biochips- analytical devices, disease diagnostics, and cancer therapy Risk potential of nonmaterial.	
4	<p>Stem cells and cancer biology:</p> <p>Stem cells: Scope, embryonic and adult stem cells, properties, identification, stem cell culture, techniques and their applications in modern clinical sciences, Cancer stem cells, tissue engineering, and regenerative medicine.</p> <p>Cancer Biology: Tumors, types of tumors, pre-disposing factors, cellular changes involved in tumor formation, genes associated with cancer (oncogenes and tumor suppressor genes), methods of tumor detection, tumor markers, treatment of cancer-chemo therapy, radiotherapy, immunotherapy, and gene therapy.</p>	11
5	<p>Vaccinology:</p> <p>History of Vaccinology, conventional approaches to vaccine development, live attenuated and killed vaccines, adjuvants, quality control, preservation and monitoring of microorganisms in seed lot systems.</p> <p>Introduction to newer vaccine approaches namely- subunit vaccines, synthetic vaccines,</p> <p>DNA vaccines, virus-like particles, recombinant vaccines, plantibodies, edible vaccines, Cancer vaccines, nanoparticles in vaccine delivery systems, benefits, and limitations.</p>	11
<p>References:</p> <ol style="list-style-type: none"> 1. Robbins S.L. (1974) Pathological basis of Disease. W B Saunders Company 2. Guyton A.C. and Hall J.E. (2006) Textbook of Medical Physiology 11th edn. Saunders 3. Hage D S and Carr J D, (2010) Analytical Chemistry & Quantitative Analysis, Prentice Hall 4. Brant W.E. and Helms C.A. (2007) Fundamentals of Diagnostic Radiology, 3rd edn. Lippincott Williams & Wilkins. 5. Glick B. R. and Pasternak J. J. 1994 “Molecular Biotechnology Principles” 6. Jogd and S N. Medical Biotechnology 2nd Edition Himalaya publishers 2008 		

Date

Course Coordinator

Subject Committee Chairperson

Department of Biotechnology

Semester-VI

DSC8: 21BSC6C8BTP: Medical Biotechnology Lab

Course Title: Medical Biotechnology Lab	Course code: 21BSC6C14BTP
Total Contact Hours: 60Hrs	Course Credits: 02
Internal Assessment Marks: 25	Duration of SEE: 03 Hrs.
Semester End Examination Marks: 25	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Understanding the classical and advanced methods used for the diagnosis of various diseases

DSC8: 21BSC6C8BTP: Medical Biotechnology Lab

List of Experiments

1. Bacteriological examination of blood and pus from clinical samples
2. Separation of mononuclear cells by Ficoll hypaque method
3. Haemoglobin estimation using a haemometer
4. Haemagglutination test - Blood Typing
5. Commercial kits-based diagnosis - Widal test, VDRL test
6. Kirby Bauer's Antibiotic Sensitivity test (bacterial)
7. Molecular genotyping of Human Papilloma Virus using PCR technique
8. Liver Functioning tests – Serum albumin and Serum bilirubin tests
9. Cytological examination of normal and tumorous cells
10. Estimation of serum cholesterol
11. Blood glucose estimation by folin wu method

References:

1. Strayer L. Biochemistry 4th Ed. (1995) W.H. Freeman Co., San Francisco, U.S.A.
2. Vishal Bansal Parar, Clinical Research Fundamental and Practice, Medical Publisher, 2010.
3. Jaypee brothers. Basic Principles of Clinical Research and Methodology, Medical Publishers (P) Ltd., 2009.
4. Gupta, S.K. Basic Principles of Clinical Research and Methodology, 1st edition, 2009.
5. Richard B Silverman, Organic Chemistry of Drug Design and Drug action Elsevier Science, Academic Press. 2014.
6. Friedman LM, Furberg CD, DeMets DL, Reboussin DM, Granger CB. Fundamentals of Clinical trials, Springer Nature, Switzerland AG, 2015.

Date

Course Coordinator

Subject Committee Chairperson

Department of Biotechnology

Semester-VI

DSC9: 21BSC6C9BTL: Immunology

Course Title: Immunology	Course code: 21BSC6C15BTL
Total Contact Hours: 56 Hrs.	Course Credits: 04
Internal Assessment Marks: 40	Duration of SEE: 02 Hrs.
Semester End Examination Marks: 60	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Demonstrate comprehension of the underlying structure and function of the immune system and related disorders.
2. Demonstrate an understanding of the role of cells and molecules in immune reactions and responses
3. Understand the fundamental concepts of immunity, and the contributions of the organs and cells in immune responses.
4. Realize how the MHC molecule's function and host encounters an immune insult.
5. Understand the antibodies and complement system
6. Understand the mechanisms involved in the initiation of specific immune responses
7. Differentiate the humoral and cell-mediated immune mechanisms
8. Comprehend the overreaction by our immune system leading to hypersensitive conditions and its consequences
9. Understand unique properties of cancer cells, immune recognition of tumors, immune evasion of cancers

DSC9: 21BSC6C9BTL: Immunology

Unit	Description	Hours
1	Cells and Organs of the Immune System: Introduction to the Immune System: History of Immunology, Clonal Selection Theory. Defense against pathogenic organisms – viruses, bacteria, fungi. Types of Immunity: first and second line of defense, innate and acquired/adaptive immunity, specificity, diversity, Self and non-self-recognition. Cells of the immune system: Antigen-presenting cells (APCs), Role of B and T-lymphocytes in Humoral immunity and cell-mediated immunity, primary and secondary immune response, Immunization, memory. Organs of the Immune system: Thymus, bone marrow, spleen, Lymph Node, peripheral lymphoid organs	12
2	Molecules of the Immune System: Antigens and haptens: Properties (foreignness, molecular size, heterogeneity). Adjuvants. Antigenicity and Immunogenicity. Affinity and Avidity. B and T cell epitopes, superantigens Immunoglobulins: Classification, structure, and function. Monoclonal and polyclonal antibodies. VDJ Gene Segments and DNA rearrangements. Major histocompatibility complexes: Classification, structure, and function.	11

	Antigen processing pathways – Cytosolic and Endocytic Cytokines: Classification and function Complement: Pathways	
3	Antigen-Antibody Reactions and Immunotechniques: Structure and properties of antigens- iso- and allo-antigens, antigen specificity, haptens, and adjuvants. Biomolecular association, Cross-reactivity, Precipitation, Immunodiffusion reactions: Radial immunodiffusion, Ouchterlony double diffusion, Immunoelectrophoresis. Agglutination: Agglutination reactions. ELISA, ELISpot Assay, RIA. Immunocytochemistry, Fluorescent Techniques, FACS. Hybridoma Technology	11
4	Autoimmune Disorders: Systemic and Organ-specific Autoimmune disorders with examples Immunodeficiencies: Primary and secondary immunodeficiencies; acquired immunodeficiency syndrome Cancer and the immune system – immune surveillance, immunological escape, cancer antigens, cancer immunotherapy	11
5	Vaccines: Conventional, peptide vaccines, subunit, DNA vaccines. Toxoids, antisera, edible vaccines, plantibodies, ISCOMs, recombinant antibodies, and Cancer vaccines. Transplantation immunology: Phases in graft rejection and immunosuppressors. Hypersensitivity: Reactions – Types I, II, and III. Delayed Type Hypersensitive Response.	11
References:		
<ol style="list-style-type: none"> 1. Textbook of Immunology, Paul Ajoy, Books and Allied (P) Ltd., 2016 2. Kuby Immunology. Kindt T.J. et al., W.H. Freeman & Co. 2018 3. Cellular and Molecular Immunology. Abbas, A.K. et al., Elsevier Saunders Co., 2015 4. Essential Immunology. Riott, I.M., Blackwell Scientific Publications, 1994 5. Immunology. Riott, I.M., Brostoff J., Male, D. Mosby Pub., 2017 6. Immunobiology. Janeway C.A. and Travers, P. Churchill Livingstone Pub., 2016 7. Instant Notes in Immunology. Lydyard PM et al. Viva Books Pvt. Ltd., 2011 8. Abbas AK, Lichtman AH, and Pillai S. (2019). Basic Immunology- Functions and Disorders of the Immune System. Elsevier, 9. Abdul, K., Abbas, Andrew K. L., Jordan, S. P. (1998). Cellular and Molecular Immunology. W.B. Saunders Publisher. Philadelphia. 10. Benjamine, E., Cocoi., Sunshine. (2000). Immunology 4th edition- Wiley-Liss. New York. 11. Borrebacc, C.A.K. (1995). Antibody Engineering, 2nd edition. Oxford University Press, Oxford. 12. Dimmock, N.J., Primrose, S.B. (1994). Introduction to Modern Virology, Blackwell Science Ltd. Oxford. 13. Hyde, R.M. (1992). Immunology, 2nd edition, Williams and Wilkins, Baltimore. 14. Kuby, J. (2003). Immunology 5th Edition. WH. Freeman and Company, NY. 15. Klaus D. Elgert (1996). Immunology. ELBS, Blackwell Scientific Publishers, London. 16. Roitt, I.M. (2017). Essential Immunology, Thirteenth edition, ELBS, Wiley Blackwell Scientific Publishers, London. 17. Goldsby, R.A, Kindt TJ and Osborne A (2000). Kuby Immunology, 4th edition, W.H. Freeman and Company, New York 18. Tizard I.R. (1995). Immunology, 4th edition, W.B. Saunders Publisher. Philadelphia. 19. Paul W.E (1989). Fundamentals in Immunology, Raven Press. NY. 		

Department of Biotechnology

Semester-VI

DSC9: 21BSC6C9BTP: Immunology Lab

Course Title: Immunology Lab	Course code: 21BSC6C16BTP
Total Contact Hours: 60Hrs	Course Credits: 02
Internal Assessment Marks: 25	Duration of SEE: 03 Hrs.
Semester End Examination Marks: 25	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Demonstrate technical skills in immunological tools and techniques
2. Apply the domain-specific knowledge and skills acquired in immunology for innovative therapies and Immunotechnologies

DSC9: 21BSC6C9BTP: Immunology Lab

List of Experiments

1. Hemagglutination of ABO Blood groups
2. Determination of Rh factor
3. Whole Count of WBC using Hemocytometer
4. Cells of the Immune System
5. Radial immunodiffusion
6. Ouchterlony double diffusion
7. ELISA – Demonstrate
8. Serum Immunoelectrophoresis
9. Western Blotting

References:

1. Handbook of Experimental Immunology, Vol. 1 & 2, Weir D.M., Wiley, 1997
2. Practical Immunology. Hudson L. and Hay F.C., Blackwell Scientific Pub., 1989

Date

Course Coordinator

Subject Committee Chairperson

Internship (As Per UGC)

Course title	Internship Discipline specific
No of contact hours	90
No credits	2
Method of evaluation	Presentations and Report submission

- ❖ Internship shall be Discipline Specific of 90 hours (2 credits) with a duration 4-6 weeks.
- ❖ Internship may be full-time/part-time (full-time during semester holidays and part-time in the academic session)
- ❖ Internship mentor/supervisor shall avail work allotment during 6th semester for a maximum of 20hours.
- ❖ The student should submit the final internship report (90 hours of Internship) to the mentor for completion of the internship.

**CBCS Question Paper Pattern for UG Semester End
Examination with effect from the AY 2021-22**

**Languages /Discipline Core Courses (DSC) & Open Elective
Courses (OEC)**

Paper Code:

Paper Title:

Max. Marks: 60

Time: 3 Hours

Instruction: Answer all Sections

SECTION-A

1. Answer the following sub-questions, each sub-question carries **ONE** mark. (10X1=10)

- a).
- b).
- c).
- .
- .
- j).

Note for Section-A: Two sub-questions from each unit.

SECTION-B

Answer any **FOUR** of the following questions, each question carries **FIVE** marks. (4X5=20)

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Note for Section-B: Minimum One question from each unit (Q No 2 to 6) and remaining one question from unit II to V (Q.No. 7)

SECTION-C

Answer any **THREE** of the following questions, each question carries **TEN** marks. (3X10=30)

- 8.
- 9.
- 10.
- 11.
- 12.

Note for Section- C: One question from each unit. Sub-questions such as 'a' and 'b' may be given for a question in section-C only.

SEC & AECC Subjects

Paper Code:

Paper Title:

Time: 1 Hours

Max. Marks: 30

There shall be Theory examinations of **Multiple Choice Based Questions [MCQs]**with **Question Paper of A, B, C and D Series** at the end of each semester for **AECCs (Environmental Studies and (ii) Constitution of India)** and **SECs (SEC-1: Digital Fluency, SEC-2: Artificial Intelligence, SEC-3: Cyber Security and SEC-4: Societal Communication)** for the duration of **One hour (First Fifteen Minutes for the Readiness of OMR and remaining Forty-Five Minutes for Answering thirty Questions)**. The Answer Paper is of **OMR (Optical Mark Reader) Sheet**.

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY, BALLARI-583 105
B. Sc.(DSCC) SEMESTER PRACTICAL
SUBJECT - BIOTECHNOLOGY

Paper Code:
Time: 3 Hours

Paper Title:
Max Marks: 25

- Q. 1. Write a Principle, procedure and perform the given experiment..... and write a report on result obtained (Major experiment) - 8M
- Q. 2. Perform Minor experiment-1 - 4M
- Q. 3. Perform Minor experiment-2/Answer the given problem/..... - 4M
- Q. 4. Identification - 6M
- 4A. Identify & comment
 - 4B. Identify & comment
 - 4C. Identify & comment
- Q. 5. Journal submission - 3M
