B.Sc. in Transplant Sciences 4 Years (8 Semesters)

Overview: B.Sc. in Transplant Sciences is an undergraduate program designed to provide students with a comprehensive understanding of the science, technology, and procedures involved in organ and tissue transplantation. The course covers essential aspects of human physiology, immunology, organ procurement, transplantation procedures, post-transplant care, and ethical and legal issues related to organ donation and transplantation.

Given the complexity of organ transplantation and its critical role in saving lives, this program prepares students to be part of multidisciplinary teams working in transplant hospitals, organ donation centers, or healthcare institutions. It emphasizes both theoretical knowledge and practical skills needed to support and assist in the transplantation process, as well as offering insight into transplant immunology, rejection mechanisms, and patient management.

Affiliated Institution: School of Medical Sciences and Technology, Malla Reddy Vishwavidyapeeth (Deemed to be University)****** The minimum eligibility for B.Sc. Transplant Sciences is a pass in 10+2 with at least 50% marks in Physics, Chemistry and Biology from a recognized board (CBSE/ISC/PUC) or equivalent

Key Highlights:

- **Organ and Tissue Transplantation**: The program provides in-depth knowledge about organ and tissue donation, transplantation procedures, immunology, and organ rejection.
- **Ethical and Legal Issues**: Students explore the ethical, legal, and social aspects of organ donation, including donor consent, transplantation ethics, and regulations surrounding organ transplant networks.
- **Immunology and Rejection Mechanisms**: Students study the immune system's response to transplants, including mechanisms of rejection and immune suppression therapies.
- **Clinical and Surgical Training**: Practical exposure is provided to clinical and surgical aspects of organ transplantation, including donor-recipient matching, pre- and post-operative care, and transplant surgeries.
- **Career Opportunities**: The program equips students for roles in healthcare facilities, transplant organizations, and research centers.

Course Curriculum:

The B.Sc. in Transplant Sciences is typically a 3-year program, incorporating both theoretical knowledge and practical experiences. Below is a typical course curriculum for this program:

Year 1:

- **Introduction to Transplant Science**
- **Human Anatomy and Physiology**

- **Introduction to Immunology**
- **Basic Biochemistry and Cell Biology**
- **Organ and Tissue Structure and Function**
- **Medical Terminology in Transplantation**
- **Ethics in Organ Donation and Transplantation**
- **Principles of Surgery and Post-Surgical Care**
- **Introduction to Medical Microbiology**

Year 2:

- **Organ and Tissue Transplantation Techniques**
- **Immunology of Transplantation**
- **Human Histocompatibility and Organ Matching**
- **Pharmacology in Transplantation (Immunosuppressive Drugs)**
- **Clinical Aspects of Transplantation**
- **Donor Management and Procurement Procedures**
- **Transplant Surgery and Postoperative Care**
- **Healthcare Management in Transplantation**
- **Transplant Infectious Diseases**

Year 3:

- **Advanced Immunology of Organ Rejection**
- **Organ Transplantation and Regenerative Medicine**
- **Stem Cell Biology and Regenerative Techniques**
- **Ethical, Legal, and Social Issues in Transplantation**
- **Patient and Family Counseling in Transplantation**
- **Psychosocial Aspects of Transplantation**
- **Organ Donation and Transplantation Policy**
- **Clinical Rotations and Internships in Transplant Centers**
- **Research Project in Transplant Sciences**

Additional/Optional Modules:

- **Organ Donation Networks and Global Issues**
- **Tissue Engineering and Bioprinting in Transplantation**
- **Advanced Transplant Immunology**
- **Organ Transplantation in Pediatrics**
- **Bioethics and Policy in Transplantation**

Career and Academic Opportunities:

Career Opportunities:

Graduates of B.Sc. in Transplant Sciences can explore a variety of career paths in both clinical and non-clinical roles within transplant centers, hospitals, medical research institutes, and healthcare organizations. Some of the career options include:

- **Transplant Coordinator**: Coordinating organ donation, procurement, and transplantation processes, ensuring that all protocols and regulations are followed.
- **Clinical Transplantation Specialist**: Working closely with transplant surgeons, immunologists, and nurses to provide care for transplant patients and assist in transplant surgeries.
- **Immunologist (Transplant Immunology)**: Specializing in the immune response to organ transplants, including studying rejection mechanisms and immune suppression therapies.
- **Organ Procurement Specialist**: Involved in the collection and transportation of organs from donors to recipients, ensuring the organs' preservation and compatibility.
- **Transplant Surgeon Assistant**: Supporting transplant surgeons during organ transplant surgeries, managing technical aspects in the operating room.
- **Transplant Nurse**: Providing post-operative care to transplant patients, including monitoring recovery and administering immunosuppressive medications.
- **Researcher in Transplantation**: Conducting research on transplantation techniques, immunology, regenerative medicine, and transplant-related diseases.
- **Ethics Consultant**: Advising hospitals and transplant teams on ethical issues related to organ donation, allocation, and patient care.
- **Health Policy Analyst in Transplantation**: Working with government or nonprofit organizations to help develop policies and regulations related to organ donation and transplantation.
- **Clinical Data Analyst in Transplantation**: Analyzing clinical data related to transplant outcomes, improving patient care protocols, and contributing to research studies.

Academic Opportunities:

Graduates can pursue higher education to further specialize in transplant sciences, immunology, regenerative medicine, or related fields. Postgraduate options include:

- **Master's in Transplant Immunology**: Specializing in the immune response in transplantation, rejection mechanisms, and immunosuppressive therapies.
- **Master's in Regenerative Medicine**: Focusing on stem cell therapy, tissue engineering, and regenerative medicine to support transplantation practices.
- **Master's in Healthcare Management**: With a focus on managing transplant units, hospitals, or healthcare systems involved in transplantation.
- **Master's in Medical Research**: Conducting advanced research in organ transplantation, immunology, and transplant surgery.
- **Master's in Bioethics**: Studying the ethical issues surrounding organ donation, transplantation, and medical decision-making.

For those interested in research or teaching roles, a **Ph.D. in Transplant Immunology** or **Regenerative Medicine** can open doors to academic and research institutions.

Professional Opportunities:

- **Certified Transplant Coordinator (CTC)**: Certification for professionals involved in organ procurement and transplantation coordination, ensuring adherence to protocols and regulations.
- **Certified Clinical Research Associate (CCRA)**: Certification for those involved in clinical research related to transplantation procedures, transplant immunology, and organ donation.
- **Registered Transplant Nurse**: For nurses specializing in the post-transplant care of patients, ensuring they receive appropriate monitoring and medication.
- **Certified Immunologist**: For those specializing in transplant immunology, focusing on immune rejection and therapies.
- **Transplant Ethics Certification**: Certification for professionals involved in ethical decision-making and policy development related to organ donation and transplantation.

Higher Education and Research Prospects:

- **Research Opportunities**: The field of transplantation offers numerous research opportunities, including organ rejection, stem cell-based therapies, immunosuppressive drugs, organ preservation, and tissue engineering.
- **Postgraduate Studies**: Graduates can pursue **Master's degrees** in **Transplant Immunology**, **Regenerative Medicine**, or **Healthcare Administration** to specialize further in the field.
- **Ph.D. Programs**: A **Ph.D. in Transplantation**, **Immunology**, or **Regenerative Medicine** opens up opportunities for a career in academic research or teaching. Research on new transplantation techniques, organ preservation, and immune tolerance is a growing field.
- **Interdisciplinary Research**: Collaboration with fields like bioengineering, pharmacology, and regenerative medicine offers promising interdisciplinary research opportunities.

Conclusion:

The **B.Sc. in Transplant Sciences** is a highly specialized program that offers students the opportunity to develop expertise in the science, technology, and ethics of organ transplantation. With a focus on immunology, organ procurement, transplantation procedures, and patient care, this program prepares students for impactful roles in transplant hospitals, research centers, and healthcare organizations.

Graduates can embark on rewarding careers in clinical transplantation, healthcare administration, immunology, and research, with numerous opportunities for further academic development and professional specialization. The increasing demand for organ transplants and advancements in transplant technology make this field crucial to the future of healthcare, offering numerous career prospects and the chance to contribute to life-saving medical practices.

Labs

1. Transplant Immunology & Histocompatibility Lab

- **Purpose**: Training in immune system response to organ transplantation and compatibility testing.
- **Equipment & Facilities**:

  - ✓ HLA (Human Leukocyte Antigen) typing kits
  - ✓ Flow cytometry for immune profiling
  - ✓ PCR-based tissue typing equipment
  - ✓ Crossmatch testing kits (Luminex, ELISA-based methods)
  - ✓ Mixed lymphocyte culture assay setup

2. Organ Preservation & Perfusion Lab

- **Purpose**: Understanding organ storage, preservation, and transport techniques.
- **Equipment & Facilities**:

  - ✓ Organ perfusion machines (kidney, liver, heart)
  - ✓ Cold storage solutions (UW, HTK, and Celsior solutions)
  - ✓ Hypothermic and normothermic perfusion setups
  - ✓ Cryopreservation and vitrification tools
  - ✓ Simulated transport incubators for organs

3. Surgical Techniques & Transplantation Lab

- **Purpose**: Training in basic surgical skills related to organ transplantation.
- **Equipment & Facilities**:

  - ✓ Laparoscopic and microsurgical instruments
  - ✓ Simulated human tissue models for anastomosis training
  - ✓ Suturing and grafting practice setups
  - ✓ Cadaveric or animal tissue models for vascular anastomosis
  - ✓ Robotic-assisted surgery training modules (optional)

4. Transplant Pathology & Histology Lab

- **Purpose**: Identification of graft rejection, pathology of transplanted organs.
- **Equipment & Facilities**:

  - ✓ Microscopes (light, fluorescence, and electron)
  - ✓ Tissue biopsy processing and staining tools
  - ✓ Immunohistochemistry (IHC) kits for rejection markers
  - ✓ Histopathology slide preparation and analysis tools
  - ✓ Digital pathology software for biopsy analysis

5. Clinical Biochemistry & Biomarkers Lab

- **Purpose**: Assessing biochemical markers for organ function and transplant success.
- **Equipment & Facilities**:

- ✓ Blood gas analyzers for organ function monitoring
- ✓ Biochemical assay kits for creatinine, liver enzymes, and electrolytes
- ✓ ELISA and PCR kits for donor-specific antibodies (DSA)
- ✓ Mass spectrometry for drug level monitoring (immunosuppressants)
- ✓ Automated analyzers for kidney, liver, and cardiac function tests

6. Microbiology & Infection Control Lab

- **Purpose**: Detection and prevention of infections in transplant patients.
- **Equipment & Facilities**:

  - ✓ Bacterial and fungal culture setup
  - ✓ PCR and serological tests for viral infections (CMV, EBV, Hepatitis)
  - ✓ Antimicrobial susceptibility testing kits
  - ✓ Sterile laminar airflow workstations
  - ✓ Endotoxin testing and contamination control systems

7. Regenerative Medicine & Stem Cell Lab *(Optional Advanced Lab)*

- **Purpose**: Exploring regenerative strategies and cellular therapies for transplantation.
- **Equipment & Facilities**:

  - ✓ Stem cell culture incubators
  - ✓ 3D bioprinting tools for tissue engineering
  - ✓ Flow cytometers for stem cell characterization
  - ✓ CRISPR gene editing and iPSC (induced pluripotent stem cells) tools
  - ✓ Cell differentiation and scaffold development tools

8. Ethical, Legal & Data Management Lab

- **Purpose**: Training in transplant ethics, documentation, and patient record management.
- **Equipment & Facilities**:

  - ✓ Electronic Medical Record (EMR) software for donor-recipient tracking
  - ✓ Database management tools for organ allocation (UNOS, NOTTO guidelines)
  - ✓ Case study simulations for ethical dilemmas
  - ✓ Transplant policy and legal documentation training
  - ✓ AI-based predictive analytics for donor-recipient matching

PROGRAM OUTCOMES (POs)

PO	Program Outcomes
PO-1	**Comprehensive Knowledge of Transplant Sciences:** Graduates will develop a strong foundation in the principles of organ transplantation, immunology, histocompatibility, and transplant-related clinical procedures
PO-2	**Clinical and Laboratory Proficiency:** Graduates will acquire hands-on skills in pre-transplant assessment, organ preservation, post-transplant monitoring, and laboratory techniques used in transplant diagnostics..
PO-3	**Ethical and Legal Awareness in Transplantation:** Graduates will understand the ethical considerations, legal frameworks, and regulatory guidelines governing organ donation and transplantation in India and globally..
PO-4	**Research and Innovation in Transplant Medicine:** Graduates will be equipped with research skills to contribute to advancements in transplantation sciences, including organ bioengineering and immunosuppressive therapies.
PO-5	**Effective Communication and Teamwork in Healthcare Settings:** Graduates will develop strong communication and teamwork skills to collaborate effectively with healthcare professionals, transplant coordinators, and patient care teams..

COURSE STRUCTURE – B.Sc. Transplant Sciences

Semester 1

Sl. No.	Broad Category	Course Code	Name of the Subject/Practical	Contact hours/week			Credits
				L	T	P	
1.	Major (Core)	BSTS101	Introduction to Transplant Sciences & Organ Donation	2	1	0	3
2.		BSTS102	Human Anatomy & Physiology (with focus on Organ Systems)	2	1	0	3
3.		BSTS103	Fundamentals of Immunology in Transplantation	2	0	2	3
4.		BSTS104	Medical Ethics & Legal Aspects of Organ Transplantation	1	1	0	2
5.	**Minor** Select any two minor courses, each worth 2 credits, for a maximum of 4 credits per semester	BSTS105	1. Basics of Pathophysiology in Organ Failure 2. Introduction to Transplant Coordination & Patient Care 3. Pharmacology of Immunosuppressant 4. Histocompatibility & Tissue Typing Techniques 5. Introduction to Regenerative Medicine & Stem Cell Therapy	1 1	1 1	0 0	4
6.	Skill Enhancement Courses	BSTS106	1. Laboratory Techniques in Transplant Diagnostics 2. Hands-on Training in Organ Preservation Methods	0 0	0 0	2 2	2
7.	Ability Enhancement Courses	BSTS107	1. English Communication Skills 2. Introduction to Biomedical Waste Management in Transplant Units	0	0	2	1
8.	Value-Added Courses	BSTS108	1. Basics of Healthcare Informatics & Data Management in Transplant Units 2. Role of Artificial Intelligence in Transplantation & Patient Monitoring	1	0	2	2
			Total	10	5	10	**20**
			Total Contact Hours	**25**			

Course outcomes for B.Sc. Transplant Sciences MAJOR- Introduction to Transplant Sciences & Organ Donation

Sr. No.	Course Outcome	Description
1	**Understand the Basics of Transplant Sciences**	Explain the fundamental principles of organ transplantation and its significance.
2	**Describe the Process of Organ Donation**	Learn about living and deceased organ donation, donor eligibility, and ethical considerations.
3	**Explain the Types of Organ Transplants**	Understand kidney, liver, heart, lung, and other organ transplants.
4	**Analyze the Immunological Basis of Organ Transplantation**	Learn about antigen compatibility, rejection mechanisms, and immunosuppression.
5	**Understand the Role of Organ Procurement Organizations (OPOs)**	Explain the function of OPOs in donor identification, organ retrieval, and allocation.
6	**Describe the Psychological and Social Impact of Organ Transplantation**	Learn about the psychological effects on donors, recipients, and families.
7	**Explain the Role of Technology in Transplantation**	Understand the advancements in organ preservation, tissue engineering, and xenotransplantation.
8	**Apply Knowledge to Promote Organ Donation Awareness**	Develop strategies to educate and encourage organ donation in communities.

Course outcomes for B.Sc. Transplant Sciences MAJOR -Human Anatomy & Physiology (with Focus on Organ Systems)

Sr. No.	Course Outcome	Description
1	**Understand the Structural Organization of the Human Body**	Explain the organization of cells, tissues, organs, and organ systems.
2	**Describe the Major Organ Systems Relevant to Transplantation**	Learn about the cardiovascular, respiratory, renal, hepatic, and nervous systems.
3	**Explain the Functional Mechanisms of Organs Commonly Transplanted**	Understand kidney filtration, liver metabolism, cardiac output, and pulmonary function.

Sr. No.	Course Outcome	Description
4	**Analyze the Role of the Immune System in Organ Function**	Learn about immune surveillance, antigen presentation, and inflammation responses.
5	**Understand the Pathophysiology of Organ Failure**	Explain how diseases lead to end-stage organ failure requiring transplantation.
6	**Describe the Physiological Changes Post-Transplantation**	Learn about graft function, metabolic changes, and immunosuppressive therapy.
7	**Explain the Role of Imaging and Diagnostic Techniques**	Understand ultrasound, MRI, CT, and biopsy techniques for organ evaluation.
8	**Apply Anatomical Knowledge to Transplant Science**	Integrate anatomy and physiology concepts into transplant procedures and patient care.

Course outcomes for B.Sc. Transplant Sciences MAJOR -Fundamentals of Immunology in Transplantation

Sr. No.	Course Outcome	Description
1	**Understand the Basics of Immunology**	Explain the innate and adaptive immune system components and their functions.
2	**Describe the Immune Response in Transplantation**	Learn about antigen recognition, T-cell activation, and B-cell responses.
3	**Explain the Mechanisms of Graft Rejection**	Understand hyperacute, acute, and chronic rejection processes.
4	**Analyze the Role of Immunosuppressive Therapy**	Learn about immunosuppressive drugs and their mechanisms of action.
5	**Understand Histocompatibility and HLA Matching**	Explain the role of HLA in transplant success and graft survival.
6	**Describe the Impact of Autoimmune Diseases on Transplantation**	Learn about how autoimmune disorders affect transplant candidates and outcomes.
7	**Explain Emerging Therapies in Transplant Immunology**	Understand advancements in tolerance induction, regulatory T-cells, and gene therapy.

Sr. No.	Course Outcome	Description
8	**Apply Immunological Knowledge in Clinical Practice**	Utilize immunology concepts in transplant patient management and graft monitoring.

Course outcomes for B.Sc. Transplant Sciences MAJOR -Medical Ethics & Legal Aspects of Organ Transplantation

Sr. No.	Course Outcome	Description
1	**Understand the Ethical Principles in Organ Transplantation**	Explain autonomy, beneficence, non-maleficence, and justice in transplantation.
2	**Describe the Legal Framework Governing Organ Donation**	Learn about national and international laws regulating organ transplantation.
3	**Explain the Process of Informed Consent in Transplantation**	Understand the importance of donor and recipient consent in transplant procedures.
4	**Analyze Ethical Dilemmas in Organ Allocation**	Learn about organ distribution policies, prioritization, and ethical controversies.
5	**Understand the Role of Regulatory Bodies in Transplantation**	Explain the function of organizations like NOTTO, UNOS, and WHO in organ donation.
6	**Describe the Impact of Illegal Organ Trade and Transplant Tourism**	Learn about black-market organ trade, exploitation, and preventive measures.
7	**Explain the Rights and Responsibilities of Donors and Recipients**	Understand legal protections, donor registries, and patient advocacy.
8	**Apply Ethical and Legal Principles in Clinical Practice**	Develop ethical decision-making skills in transplant case management.

Course outcomes for B.Sc. Transplant Sciences MINOR- Basics of Pathophysiology in Organ Failure

Sr. No.	Course Outcome	Description
1	**Understand the Basic Mechanisms of Organ Failure**	Explain the physiological and pathological changes leading to organ dysfunction.

Sr. No.	Course Outcome	Description
2	**Describe the Causes of End-Stage Organ Failure**	Learn about diseases leading to kidney, liver, heart, and lung failure.
3	**Explain the Role of Inflammation and Oxidative Stress**	Understand how chronic inflammation contributes to organ failure.
4	**Analyze the Impact of Metabolic Disorders on Organ Health**	Learn how diabetes, obesity, and hypertension affect organ function.
5	**Understand the Process of Fibrosis and Cellular Damage**	Explain how fibrosis leads to irreversible organ damage.
6	**Describe the Pathophysiology of Ischemia and Reperfusion Injury**	Learn about tissue damage during organ transplantation.
7	**Explain the Mechanisms of Organ Regeneration**	Understand the potential of regenerative medicine in treating organ failure.
8	**Apply Pathophysiological Knowledge in Clinical Settings**	Utilize knowledge in diagnosing and managing organ failure cases.

Course outcomes for B.Sc. Transplant Sciences MINOR -Introduction to Transplant Coordination & Patient Care

Sr. No.	Course Outcome	Description
1	**Understand the Role of a Transplant Coordinator**	Explain the responsibilities of transplant coordinators in patient management.
2	**Describe the Organ Procurement and Allocation Process**	Learn about donor identification, consent, and organ matching.
3	**Explain the Importance of Pre- and Post-Transplant Patient Care**	Understand the medical, psychological, and social aspects of transplant care.

Sr. No.	Course Outcome	Description
4	**Analyze Ethical Considerations in Transplant Coordination**	Learn about patient rights, informed consent, and organ allocation ethics.
5	**Understand the Role of Multidisciplinary Teams in Transplantation**	Explain the importance of collaboration between healthcare professionals.
6	**Describe the Psychosocial Impact of Organ Transplantation**	Learn about emotional support and counseling for donors and recipients.
7	**Explain the Process of Patient Education in Transplant Care**	Understand how to educate patients about lifestyle changes post-transplant.
8	**Apply Coordination Skills in Transplant Programs**	Develop organizational and communication skills for effective transplant coordination.

Course outcomes for B.Sc. Transplant Sciences MINOR- Pharmacology of Immunosuppressant's

Sr. No.	Course Outcome	Description
1	**Understand the Mechanisms of Immune Suppression**	Explain how immunosuppressants prevent organ rejection.
2	**Describe the Classification of Immunosuppressive Drugs**	Learn about calcineurin inhibitors, corticosteroids, and biologics.
3	**Explain the Pharmacokinetics and Pharmacodynamics of Immuno suppressants**	Understand drug absorption, metabolism, and effects on the immune system.
4	**Analyze the Side Effects and Risks of Immunosuppressive Therapy**	Learn about infections, malignancies, and drug toxicity.

Sr. No.	Course Outcome	Description
5	**Understand Drug Interactions in Transplant Patients**	Explain how immune suppressants interact with other medications.
6	**Describe Personalized Medicine Approaches in Transplant Pharmacology**	Learn about individualized immunosuppressive therapy based on patient needs.
7	**Explain the Role of Therapeutic Drug Monitoring (TDM)**	Understand how drug levels are monitored to prevent toxicity and rejection.
8	**Apply Pharmacological Knowledge in Clinical Transplant Care**	Utilize immunosuppressive therapy principles in patient management.

Course outcomes for B.Sc. Transplant Sciences MINOR-Histocompatibility & Tissue Typing Techniques

Sr. No.	Course Outcome	Description
1	**Understand the Concept of Histocompatibility**	Explain the role of HLA in organ transplantation.
2	**Describe the Importance of HLA Matching in Transplants**	Learn how donor-recipient compatibility affects graft survival.
3	**Explain the Principles of Tissue Typing Techniques**	Understand PCR, flow cytometry, and serological methods.
4	**Analyze Crossmatching and Antibody Screening Methods**	Learn how pre-transplant testing prevents rejection.
5	**Understand the Role of Molecular Techniques in Transplantation**	Explain the use of genetic typing in donor selection.
6	**Describe Emerging Technologies in Histocompatibility Testing**	Learn about next-generation sequencing (NGS) and its applications.
7	**Explain the Impact of Histocompatibility on Transplant Outcomes**	Understand how mismatches contribute to graft failure.
8	**Apply Histocompatibility Testing Knowledge in Clinical Settings**	Utilize tissue typing techniques in transplant diagnostics.

Course outcomes for B.Sc. Transplant Sciences MINOR Introduction to Regenerative Medicine & Stem Cell Therapy

Sr. No.	Course Outcome	Description
1	**Understand the Basics of Regenerative Medicine**	Explain the principles of tissue engineering and regenerative therapies.
2	**Describe the Types of Stem Cells and Their Applications**	Learn about embryonic, adult, and induced pluripotent stem cells.
3	**Explain the Mechanisms of Stem Cell Differentiation**	Understand how stem cells develop into specialized tissues.
4	**Analyze the Role of Stem Cell Therapy in Organ Repair**	Learn about the use of stem cells in liver, kidney, and heart regeneration.
5	**Understand the Challenges and Ethical Considerations in Stem Cell Therapy**	Explain ethical concerns and regulatory guidelines in regenerative medicine.
6	**Describe the Emerging Trends in Organ Regeneration**	Learn about bio printing, gene editing, and organoids.
7	**Explain the Clinical Applications of Stem Cell-Based Transplantation**	Understand ongoing clinical trials and approved therapies.
8	**Apply Regenerative Medicine Principles in Transplant Research**	Utilize knowledge in developing novel transplant therapies.

Program Details

- **Duration**:4Years (8 Semesters)
- **Total Credits**: **160–180 credits**
- **Total Teaching & Training Hours**: **6,000–6,500 hours**
- **Mode**: Classroom, Laboratory, Clinical Training, and Internship

- **Assessment**: Continuous Internal Assessment (CIA), Semester-End Examinations, Practical Examinations, Clinical Case Presentations, and Research Project
- **Internship & Research**: **One-Year Clinical Internship (Final Year)**

Total Hours Distribution

- **Theory Classes** – 2,500–2,800 hours
- **Practical & Laboratory Training** – 1,500–1,800 hours
- **Clinical Training & Internship** – 1,000–1,200 hours
- **Research & Dissertation** – 300–500 hours

Assessment Methods

Assessment Component	Weightage (%)	Details
Continuous Internal Assessment (CIA)	**40%**	Includes internal exams, assignments, presentations, case studies, and practical performance
End-Semester Examination (ESE)	**60%**	Divided into theory (40%) and practical (20%)
Mid-Semester Exams	**20%** (Part of CIA)	Two internal tests per semester
Assignments & Case Studies	**5%** (Part of CIA)	Research-based assignments, patient case studies, and literature reviews
Seminars & Presentations	**5%** (Part of CIA)	Oral/poster presentations on diabetes management and treatment approaches
Practical Performance & Clinical Evaluation	**5%** (Part of CIA)	Skill-based assessments in diabetic labs and clinical settings
Attendance & Participation	**5%** (Part of CIA)	Regularity in theory & practical sessions
Theory Examination (Final)	**40%** (Part of ESE)	Structured written paper covering subject knowledge
Practical Examination (Final)	**20%** (Part of ESE)	Includes viva, skill demonstration, and clinical diabetes case handling
Dissertation/Research Project (Final Year)	**Mandatory**	Evaluated in the final year by internal & external examiners
Clinical Internship/Training in Diabetes Care Centers	**Pass/Fail**	Logbook-based evaluation with mentor review

Marking System & Grading

Marks (%)	Grade	Grade Point (GPA/CGPA Equivalent)	Classification
90 - 100	O (Outstanding)	10	First Class with Distinction
80 - 89	A+ (Excellent)	9	First Class with Distinction
70 - 79	A (Very Good)	8	First Class
60 - 69	B+ (Good)	7	First Class
50 - 59	B (Satisfactory)	6	Second Class
<50 (Fail)	F (Fail)	0	Fail (Re-exam Required)

Pass Criteria:

- **Minimum 50% marks in each subject** (Theory & Practical separately).
- **Aggregate of 55% required for progression** to the next semester.
- **No more than two backlogs** allowed for promotion to the final year.

Exam Pattern for Theory & Practical

A. Theory Examination Pattern

Total Marks: 100 (Converted to 40% for End-Semester Assessment)
Duration: 3 Hours

Section	Question Type	No. of Questions	Marks per Question	Total Marks
Section A	Short Answer Type (SAQ)	10 (Attempt all)	2	20
Section B	Long Answer Type (LAQ)	5 (Attempt any 4)	10	40
Section C	Case-Based/Clinical Scenarios	3 (Attempt any 2)	15	30
Section D	MCQs/Objective Type	10 (Compulsory)	1	10
Total				**100**

Weightage:

- Immunology & Organ Compatibility – 40%
- Transplantation Procedures & Ethics – 30%
- Post-Transplant Patient Management – 20%

- Research & Case Studies in Transplant Sciences – 10%

Passing Criteria: Minimum **50% (50/100 marks)**

B. Practical Examination Pattern

Total Marks: 100 (Converted to 20% for End-Semester Assessment)
Duration: 4–6 Hours

Component	Marks Distribution
Clinical Case Presentation & Pre/Post-Transplant Patient Assessment	30
OSCE (Objective Structured Clinical Examination) – Skill Demonstration	25
Organ Preservation & Transplant Coordination	20
Lab-Based Examination (Histocompatibility Testing, Immunosuppression Monitoring, Tissue Typing)	15
Record Work (Logbook & Assignments)	10
Total	**100**

OSCE (Skill-based Assessment) includes stations on:

- Organ Procurement & Preservation Techniques
- HLA Typing & Crossmatching for Transplant Compatibility
- Post-Transplant Monitoring & Immunosuppressive Therapy Management
- Ethical & Legal Aspects of Organ Donation & Transplantation

Passing Criteria: Minimum 50% (50/100 marks) in practicals.

E-Resources & Journals

- **American Journal of Transplantation**
- **The Lancet Transplantation Reviews**
- **World Health Organization (WHO) Guidelines on Organ Transplantation**
- **United Network for Organ Sharing (UNOS) – www.unos.org**

Career Opportunities after B.Sc. in Transplant Sciences

- Transplant Coordinator in Hospitals & Organ Banks
- Clinical Research Associate in Transplantation Studies
- Biotech Specialist in Organ Preservation & Tissue Engineering
- Transplant Laboratory Technologist
- Medical Representative in Immunosuppressant Drug Industry