# Unit V: Intellectual Property and Patents

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# Introduction to Intellectual Property Rights (IPR)

# Warm-Up

**Question:**

- What gives innovators like inventors, authors, and designers the right to protect their ideas?
- Can "ideas" be owned legally?

*Goal: To understand how intellectual creations become legally protected through IPR.*

# What is Intellectual Property (IP)?

- Intellectual Property (IP) refers to creations of the human mind such as inventions, artistic works, designs, and symbols.
- IP provides legal recognition to creative and innovative outcomes.
- The law grants creators exclusive rights to use, sell, or license their creations for a specific period.
- Encourages innovation by ensuring financial and moral rewards.

# Types of Intellectual Property Rights

- **Patents:** Protection for inventions, processes, or systems offering new solutions.
- **Copyrights:** Protection for original literary, artistic, and software works.
- **Designs:** Protection for aesthetic appearance or shape of products.
- **Trademarks:** Identifies source through brand name, logo, or symbol.
- **Trade Secrets:** Confidential business information providing a competitive advantage.

# Importance of IPR in Research and Development

- Motivates innovation by rewarding creativity and effort.
- Prevents unauthorized use or imitation of research outcomes.
- Facilitates technology transfer and commercialization.
- Encourages academic-industry collaboration.
- Supports nation's economic growth through innovation-led markets.

# Economic and Strategic Value of IP

- Acts as a marketable asset for universities and industries.
- Increases institutional ranking and research reputation.
- Can be licensed, sold, or used as collateral.
- Example: Google's PageRank patent and Apple's design patents significantly enhanced company valuation.

# IP in the Context of Academia

- Research scholars and faculty are encouraged to protect innovations via patents.
- Institutions often have IP cells or Technology Transfer Offices (TTO).
- IP protection supports academic entrepreneurship.
- Promotes innovation-based teaching and funding opportunities.
- Example: NITs and IITs file hundreds of patents annually under IPR policies.

# IPR and Innovation Cycle

- **Idea → Research → Prototype → Patent → Commercialization.**
- IPR transforms research into tangible socio-economic benefits.
- Protects both process and product innovations.
- Encourages reinvestment in R&D through licensing revenues.

# Legal Framework for IPR in India

- Governed by the **Department for Promotion of Industry and Internal Trade (DPIIT)**.
- Major legislations:
  - The Patents Act, 1970 (amended 2005)
  - The Copyright Act, 1957
  - The Designs Act, 2000
  - The Trade Marks Act, 1999
- Administered through the **Office of the Controller General of Patents, Designs, and Trademarks (CGPDTM)**.

# Global IP Organizations

- **World Intellectual Property Organization (WIPO):** UN agency promoting IP worldwide.
- **World Trade Organization (WTO):** Oversees TRIPS Agreement (Trade-Related Aspects of IP Rights).
- **Paris Convention:** Protects industrial property internationally.
- **Berne Convention:** Protects literary and artistic works.

# Case Example: Innovation to IP Success

- **Case:** Indian Railways' "Vande Bharat Express" design was filed for industrial design protection.
- **Impact:** Prevented imitation and established ownership of indigenous design.
- **Learning:** Protecting innovation ensures national and institutional recognition.

# Activity: Identify an IP Around You

**Task:**

- Look for any product, technology, or software around you.
- Identify which type of IP applies (Patent, Design, Copyright, or Trademark).
- Write a short note (150–200 words) explaining why and how it qualifies as that IP.
- Submit by next session.

# Summary

- Intellectual Property protects innovative and creative works legally.
- Key types: Patents, Designs, Copyrights, Trademarks, and Trade Secrets.
- Encourages innovation and rewards creators.
- Essential for academic, industrial, and national growth.
- Foundation for patenting and commercialization in upcoming lectures.

# Overview of Patents, Designs, and Copyrights

# Warm-Up

**Question:**

- What makes an idea "protectable"?
- Can a simple drawing, a new gadget, and a line of code all be legally owned?

*Goal: To understand the distinction between various forms of intellectual protection.*

# Understanding the Three Pillars of IP

- Intellectual creations can be protected under three primary laws:
  - **Patents** – Protect technical inventions or innovations.
  - **Designs** – Protect the visual or aesthetic appearance of a product.
  - **Copyrights** – Protect original literary, artistic, or digital works.
- Each type has distinct criteria, duration, and protection scope.

# Patents: Definition and Purpose

- A patent is a legal right granted for an invention that is new, useful, and non-obvious.
- Protects the functional or technical aspects of a product or process.
- Prevents others from making, using, or selling the invention without permission.
- Encourages R&D by rewarding inventors with exclusive rights for a limited time.

# Criteria for Patentability

- **Novelty:** Must be new and not published or used anywhere in the world.
- **Inventive Step:** Should not be obvious to someone skilled in the field.
- **Industrial Applicability:** Must have practical use or application.
- **Non-patentable categories:**
  - Abstract theories, algorithms, and mathematical models.
  - Aesthetic creations, business methods, and natural discoveries.

# Types and Duration of Patents

- **Utility Patent:** For inventions with technical utility (valid for 20 years).
- **Design Patent:** For product designs with visual innovation (10 years, extendable).
- **Plant Patent:** For new varieties of plants produced asexually.
- In India, patent validity is 20 years from the filing date, subject to renewal fees.

# Industrial Designs: Definition and Significance

- Protects visual features of shape, configuration, pattern, or ornament applied to an article.
- Concerned with appearance, not the functional aspect.
- Encourages creativity in product aesthetics.
- Example: The outer body design of an iPhone or a car model.
- Governed in India by the **Designs Act, 2000.**

# Requirements for Design Protection

- Must be **new or original** and not previously disclosed.
- Should be **appealable to the eye** (visible features).
- Must not include mechanical or functional elements.
- Registration is valid for **10 years**, renewable for another 5 years.
- Gives exclusive right to the owner to use and license the design.

# Copyrights: Definition and Scope

- Copyright protects **original literary, artistic, and digital works.**
- It arises automatically upon creation; registration strengthens proof.
- Includes software, books, music, films, photographs, architectural drawings, etc.
- Grants exclusive rights to reproduce, distribute, and adapt the work.
- Governed in India by the **Copyright Act, 1957.**

# Duration of Copyright Protection

- **Literary, Musical, Artistic Works:** Life of the author + 60 years.
- **Cinematograph Films, Sound Recordings:** 60 years from publication.
- **Software:** Treated as literary work, protected for 60 years post-author's death.
- After expiration, works enter the **public domain.**

# Comparison Table

| **Aspect** | **Patent** | **Design** | **Copyright** |
|---|---|---|---|
| Subject | Invention / Process | Appearance / Shape | Creative Work |
| Law | Patents Act, 1970 | Designs Act, 2000 | Copyright Act, 1957 |
| Duration | 20 years | 10 + 5 years | Life + 60 years |
| Nature | Technical | Aesthetic | Artistic / Literary |
| Registration | Mandatory | Mandatory | Optional |
| Example | Engine design | Car shape | Novel / Software code |

# Case Examples

- **Patent:** Google's PageRank algorithm – innovation in web search ranking.
- **Design:** Coca-Cola bottle shape – registered industrial design.
- **Copyright:** Microsoft Windows OS source code – protected as software.
- Each protection type ensures creators retain control and benefit from their work.

# Activity: Identify and Classify

**Task:**

- Select three products or works (e.g., mobile app, novel, and vehicle model).
- Classify each under Patent, Design, or Copyright.
- Mention justification in 2–3 lines for each.
- Submit as a one-page handwritten or typed note next class.

# Summary

- Patents protect inventions; Designs protect aesthetics; Copyrights protect creativity.
- Each IP type has specific legal framework and duration.
- Proper identification ensures stronger protection and commercialization.
- Foundation laid for next topic: the patenting process — from research to innovation.

# Patenting Process: From Research to Innovation and Development

# Warm-Up

**Question:**

- What transforms a research idea into a patented innovation?
- Is every research outcome patentable?

*Goal: To understand how research progresses toward patent filing and commercialization.*

# From Research to Innovation

- Research generates new knowledge; innovation applies that knowledge practically.
- The patent system bridges the gap between scientific discovery and industrial application.
- Every innovative solution should meet patentability criteria: novelty, inventive step, and utility.
- Example: Transition of a lab-developed IoT sensor into a commercial safety device through patent protection.

# Stages in the Patenting Process

1. **Idea Generation and Documentation** – Record every new concept or design with technical drawings and data.
2. **Prior Art Search** – Check existing patents or publications to ensure novelty.
3. **Drafting the Patent Specification** – Describe invention clearly: title, background, claims, and abstract.
4. **Filing the Application** – Submit to Indian Patent Office (IPO) or via online portal.
5. **Examination, Publication, and Grant** – Review by examiner $\rightarrow$ publication $\rightarrow$ final grant or rejection.

# Step 1: Idea Generation & Record Keeping

- Maintain a detailed **Research Logbook** with dates, sketches, and results.
- Include experimental evidence or prototypes.
- Get entries signed by a supervisor or collaborator to establish authorship.
- Helps in resolving disputes on originality or inventorship.

# Step 2: Prior Art Search

- Conduct searches in patent databases to ensure invention is new.
- Key databases:
  - **Indian Patent Advanced Search System (InPASS)**
  - **Google Patents**
  - **Espacenet (Europe)**
  - **WIPO Patentscope**
- Identify similar inventions and analyze claim language.
- Prevents duplication and improves application quality.

# Step 3: Drafting the Patent Application

- Drafting is the most critical part of the process.
- Components of a patent document:
  1. Title of the invention
  2. Field of invention and background
  3. Summary and description of drawings
  4. Claims (define scope of protection)
  5. Abstract (150–200 words)
- Claims determine legal enforceability — must be written precisely.

# Step 4: Filing and Publication

- Application filed with the **Indian Patent Office (IPO)** – online or offline.
- Filing Types:
  - **Provisional Application:** For incomplete inventions; establishes priority date (valid 12 months).
  - **Complete Specification:** Full disclosure with claims; required for examination.
- Published automatically after 18 months unless an early publication request is made.
- Publication makes the invention public but protected from infringement.

# Step 5: Examination and Grant

- Request for examination must be filed within 48 months from priority date.
- Examiner checks novelty, utility, and inventive step.
- Applicant responds to objections (First Examination Report – FER).
- If satisfied, the controller grants patent and issues patent number.
- The patent is then published in the Indian Patent Journal.

# Maintaining and Commercializing a Patent

- Renewal fees must be paid annually from the 3rd year onwards.
- Patent can be monetized through:
  - Licensing to companies.
  - Technology transfer to startups.
  - Assignment to industry partners.
- Encourages entrepreneurship and innovation-based revenue generation.

# Indian Patent Application Flow (Summary Diagram)

1. Idea & Documentation
2. Patent Search
3. Draft Specification
4. File Application
5. Publication $\rightarrow$ Examination $\rightarrow$ Grant
6. Renewal and Commercialization

**Average Timeline:** 2–3 years from filing to grant.

# Example: Indian Innovation to Patent

- **Case:** "Raksha – IoT-based Safety Locket" filed by NIT Jamshedpur researchers.
- Patent covered sensor integration, alert mechanism, and IoT tracking.
- Application Process: Provisional $\rightarrow$ Complete $\rightarrow$ Published $\rightarrow$ Under Examination.
- Shows how academic research translates into real societal innovation.

# Activity: Patent Process Mapping

**Task:**

- Select your current project or idea.
- Map its readiness for patenting by identifying:
  1. Novelty
  2. Industrial applicability
  3. Next steps toward filing
- Submit a 1-page flow diagram in the next class.

# Summary

- Patenting bridges research and real-world application.
- The process includes documentation, search, drafting, filing, examination, and grant.
- Provisional and complete specifications safeguard innovation.
- Commercialization transforms patents into impactful technologies.
- Next: International patent cooperation and PCT framework.

# International Cooperation, PCT, and Global IP Framework

# Warm-Up

**Question:**

- If you file a patent in India, is it automatically protected worldwide?
- How do inventors safeguard their innovation across multiple countries?

*Goal: To understand global IP systems and how international cooperation supports inventors.*

# Need for International Cooperation in IP

- Inventions today have global markets and cross-border applications.
- Countries must cooperate to ensure reciprocal recognition of IP rights.
- Simplifies the process of filing patents in multiple nations.
- Prevents duplication of examination efforts and harmonizes standards.
- Facilitates technology exchange and trade across borders.

# Key International IP Organizations

- **WIPO (World Intellectual Property Organization):** – Specialized UN agency promoting global IP protection. – Headquarters: Geneva, Switzerland. – Administers 26 international treaties including PCT, Berne, and Paris Conventions.
- **WTO (World Trade Organization):** – Enforces the TRIPS (Trade-Related Aspects of IP Rights) Agreement. – Links IP protection with global trade obligations.

# Major International Treaties on IP

- **Paris Convention (1883):** – Foundation for protection of industrial property. – Establishes the "Right of Priority" for patent filings across member countries.
- **Berne Convention (1886):** – Protects literary and artistic works (basis for copyright law).
- **TRIPS Agreement (1995):** – Minimum standards for IP protection under WTO.
- **Budapest Treaty:** – Deals with recognition of microorganisms deposited for patent purposes.

# The Patent Cooperation Treaty (PCT)

- Established in 1970 and administered by WIPO.
- Simplifies filing for patents in multiple countries with a single international application.
- Operates in **two phases:** International and National.
- Reduces effort and cost for multi-country protection.
- Currently has over 150 contracting member states.

# Phases of PCT Process

1. **International Phase:**
   - Applicant files one PCT application designating member countries.
   - Receives an International Search Report (ISR) and Written Opinion.
   - Optional International Preliminary Examination (IPEA) to assess patentability.
2. **National Phase:**
   - Within 30/31 months, applicant files separately in each chosen country.
   - Each national office examines and grants protection based on local law.

# Advantages of Filing Under PCT

- Single filing valid across all PCT member countries.
- Delays need for multiple national filings (up to 30 months).
- Comprehensive search and examination reports improve quality.
- Simplifies translation, documentation, and procedural formalities.
- Enables strategic planning for international patenting decisions.

# Limitations of PCT System

- PCT does not grant an "international patent" — only simplifies filing.
- Each country's patent office still makes the final decision.
- Application fees and translations can be expensive for multiple countries.
- Non-PCT countries require separate national applications.

# International Cooperation: India's Role

- India is a member of WIPO, Paris, Berne, and TRIPS agreements.
- Indian Patent Office functions as a PCT **Receiving Office** and **International Searching Authority (ISA)**.
- Promotes global recognition of Indian innovations.
- Example: Indian researchers filing through PCT can later extend protection to USA, Japan, and EU.

# Example: PCT Application Flow

1. Researcher files PCT at IPO (Receiving Office).
2. WIPO assigns International Application Number and conducts Search.
3. Report shared within 16 months.
4. Applicant enters National Phase within 30 months for selected countries.
5. Local offices grant patents after examination.

**Outcome:** A synchronized, efficient route for multi-nation patent protection.

# Case Example: Indian Innovation via PCT

- **Case:** "AI-based Traffic Signal Optimization System" filed by IIT Madras under PCT.
- Enabled protection in 7 major markets including US, EU, and Japan.
- Collaboration with industry partners for deployment and licensing.
- Demonstrates the impact of international patent cooperation for scalability.

# Activity: PCT Path Mapping

**Task:**

- Create a visual map (flowchart) of the PCT process.
- Include key steps: International filing $\rightarrow$ Search $\rightarrow$ Publication $\rightarrow$ National Phase $\rightarrow$ Grant.
- Use PowerPoint, Canva, or LaTeX TikZ.
- Submit your diagram in the next class.

# Summary

- International cooperation harmonizes patent systems worldwide.
- WIPO and WTO lead IP globalization through treaties and TRIPS.
- PCT simplifies multi-country patent filing via a single application.
- India plays an active role in the global IP network.
- Understanding PCT is crucial for global innovation protection.

# Procedures for Patent Grants, Timelines, and Patent Search Practice

# Warm-Up

**Question:**

- How long does it typically take for a patent to be granted?
- What steps must an inventor complete before the final grant?

*Goal: To understand the procedural workflow and conduct a real patent search.*

# Patent Grant Overview

- The patent grant is the final step after filing, examination, and approval.
- Confers exclusive legal rights to the inventor for 20 years.
- Ensures protection against unauthorized use or duplication.
- Governed by the **Indian Patents Act, 1970 (amended 2005)**.

# Stages of Patent Grant in India

1. Filing of Application
2. Publication
3. Request for Examination (RFE)
4. Examination and First Examination Report (FER)
5. Response to FER and Hearings
6. Grant or Refusal
7. Post-Grant Maintenance

**Timeline:** 2–3 years under normal processing; 12–18 months under fast-track route.

# Filing and Publication Stage

- Application may be **Provisional** or **Complete Specification**.
- Filed at any branch of the Indian Patent Office (Delhi, Mumbai, Chennai, Kolkata).
- Published automatically after 18 months from filing date.
- Option for early publication within 1 month using Form 9.
- Once published, the invention gains provisional protection rights.

# Examination Process

- Applicant must file a **Request for Examination (Form 18)** within 48 months.
- Examiner reviews for novelty, inventive step, and utility.
- **First Examination Report (FER)** issued with objections, if any.
- Applicant must reply or amend claims within 6 months.
- Hearing may be scheduled before Controller's decision.

# Patent Grant and Post-Grant Requirements

- If objections are cleared, patent is granted and published in the Patent Journal.
- Patent certificate issued by the Controller of Patents.
- Renewal fee required from the 3rd year onward until the 20th year.
- Patentee must submit annual working statements (Form 27).
- Patent rights can be licensed, assigned, or commercialized.

# Patent Timelines Summary (India)

| **Stage** | **Timeline** |
|---|---|
| Filing to Publication | 18 months (standard) / 1 month (early) |
| Request for Examination | Within 48 months of filing |
| FER Issuance | 6–9 months post-examination request |
| Response to FER | Within 6 months (extendable by 3 months) |
| Grant of Patent | 12–36 months total (avg.) |
| Renewal | From 3rd year till 20th year |

# Patent Search: Why It Matters

- Ensures invention is novel and non-obvious before filing.
- Helps identify similar existing technologies ("prior art").
- Saves cost and time by avoiding redundant inventions.
- Guides researchers to refine and improve their concepts.
- Essential for drafting strong, defensible claims.

# Popular Patent Search Databases

- **InPASS (Indian Patent Advanced Search System):** Official database of the Indian Patent Office. Website: `https://ipindia.gov.in/`
- **Google Patents:** Global, easy-to-use interface for initial searches.
- **WIPO PATENTSCOPE:** Accesses PCT and international filings.
- **Espacenet (EPO):** European Patent Office's extensive global database.

# Conducting a Basic Patent Search

1. Define key **keywords** or technical terms for your invention.
2. Use **Boolean operators** (AND, OR, NOT) to refine results.
3. Filter by country, applicant, publication year, or classification.
4. Review similar patents and identify overlapping claims.
5. Save search results for documentation and reference.

# Example: Patent Search Practice

**Topic:** IoT-Based Smart Waste Management System

- Keywords: "IoT", "Smart Waste", "Sensor Bin", "Automation".
- Search Platforms: Google Patents, WIPO, InPASS.
- Findings:
  - Several existing patents in waste monitoring.
  - Gap identified in real-time route optimization — potential new claim.
- Learning: A thorough search improves novelty and focus before filing.

# Activity: Live Patent Search Task

**Task:**

- Use **Google Patents** or **InPASS**.
- Search patents related to your project/research area.
- Note:
  1. Title and Publication Number
  2. Filing Date and Applicant
  3. Abstract Summary
  4. Novelty you can add beyond this work
- Submit a short (1-page) search report next session.

# Summary

- Patent grant involves multiple procedural stages — filing, examination, and maintenance.
- Timelines depend on the type of application and request speed.
- Patent searches validate novelty and guide research direction.
- Tools like InPASS, WIPO, and Google Patents are essential resources.
- Mastery of this process empowers researchers to protect and commercialize innovations globally.