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Research Article

Strengthening Digital Justice Governance: A Decision Science Approach to Amendments in ITA 2000, BNS 2023, And BSA 2023 For Next-Generation Cybercrime

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ABSTRACT

Judicial activism has enabled courts to apply legal jurisprudence, cyber laws, and criminal laws to address emerging cybercrimes. However, the IT Act 2000/2008, Bharatiya Nyaya Sanhita (BNS) 2023, and Bharatiya Sakshya Adhiniyam (BSA) 2023 lack specific provisions to regulate punishments and combat next-generation cyber threats. The rise of AI-driven attacks, deep fakes, ransom ware, and data breaches demands stronger legal measures. While these laws provide a foundation, amendments are needed to enhance enforcement, digital forensics, and judicial processes. This study analyses legal gaps and proposes reforms, including AI-based cybercrime detection, enhanced electronic evidence admissibility, digital identity protection, and cross-border jurisdiction. Using legal analytics, risk assessment models, and information systems management, the research recommends a harmonized framework to strengthen cyber security, improve investigations, and ensure digital justice. punishments, including fines and imprisonment, shall be determined based on the risk exposure and impact of cyber-attacks on critical infrastructure, individuals, organizations, or the government.

Keywords: Risk Assessment, Next-Generation Cybercrimes , AI-Driven Threats Digital Evidence Laws , Cyber security Regulations , International Cooperation.

1. INTRODUCTION

The Information Technology Act, 2000 lacks specific legal provisions to address emerging cyber threats such as AI-powered attacks, deepfakes, crypto jacking, ransom ware 2.0, metacrime, and quantum computing-based cybercrimes. This absence creates significant enforcement challenges, leaving modern cybercriminal activities largely unregulated. Additionally, the Act does not define AI-driven threats or incorporate mechanisms to counter cyber warfare, espionage, and state-sponsored cyber-attacks, making national security vulnerable to sophisticated digital intrusions.

Data protection under the IT Act is weak, as Sections 43A and 72A offer limited safeguards against biometric breaches, mass surveillance, and data theft. With growing digital data usage, stricter laws are needed to prevent unauthorized access. Penalties under Sections 66 and 66C are mild, failing to deter financial fraud, identity theft, and hacking, allowing cybercriminals to exploit loopholes with minimal consequences. Intermediary liability under Section 79 shields digital platforms from accountability for harmful content, enabling deepfakes, misinformation, and AI fraud to spread unchecked. The Act lacks provisions for international cooperation, extradition, and cross-border evidence sharing, making global cybercrime enforcement ineffective. Forensic investigation standards are out-dated, with no clear guidelines for handling block chain evidence, encrypted data, or darknet crimes. Weak forensic protocols hinder law enforcement in prosecuting cybercriminals. The IT Act, 2000, must be revised to regulate AI threats, improve ransom ware and IoT security, strengthen cyber warfare laws, and enhance forensic techniques for effective cybercrime enforcement.

The BNS, 2023 modernizes India's legal system by integrating traditional principles with contemporary legal challenges. It retains most IPC offenses while introducing community service, new terrorism and organized crime laws, and replacing sedition with offenses endangering national sovereignty. Key changes include

"mental illness" replacing "unsound mind," yet concerns arise over overlapping laws, inconsistent penalties, and procedural complexities. The removal of Section 377 IPC (decriminalizing male rape and bestiality) and reduced punishment for identity-based group murder are contentious. The BNS emphasizes stricter penalties, deterrence, and accountability but requires careful implementation to ensure fairness and avoid disproportionate sentencing.

The BSA, 2023 modernizes evidence laws by recognizing electronic records, allowing digital and secondary evidence, strengthening documentary evidence rules, and revising witness examination procedures. It establishes legal presumptions for electronic agreements and digital signatures while incorporating forensic techniques for cybercrime investigations.

However, it lacks provisions for AI-generated evidence, deep fakes, and manipulated digital content. The absence of clear forensic certification protocols raises authenticity concerns. It does not explicitly address block chain records, encrypted communications, or cloud-stored evidence, creating gaps in financial and cybercrime cases. Cross-border data retrieval and international cooperation remain unclear, while the admissibility of hacked or unlawfully obtained digital evidence is ambiguous. Inconsistent rules on the presumption of authenticity and metadata analysis weaken its effectiveness. The Act also lacks alignment with global best practices, limiting its applicability in international legal matters. While BSA introduces key reforms, these limitations require amendments to ensure a future-ready legal framework for next-generation cybercrimes.

BNS, IPC 1860, and ITA 2000/2008 address cyber threats like identity theft, wiretapping, cyber stalking, and cyber warfare, but lack clarity on next-gen cybercrimes[1] such as crypto jacking, AI-driven attacks, deep fake manipulation, ransom ware 2.0, quantum threats, IoT exploits, and metacrime. The legal framework struggles with intermediary liability, safe harbor protections, and cross-border enforcement, leaving gaps in prosecuting evolving cyber threats. Strengthening digital evidence laws, international cooperation, and dynamic cyber security statutes is crucial for future cyber resilience.

STATISTICAL FRAMEWORK FOR CYBERCRIME COMPENSATION, INSURANCE AND PENALTY CALCULATION

This framework uses quantitative models to calculate compensation and insurance for cyber victims and assess penalties for cybercriminals by analysing the likelihood and impact of cyber threats. It applies statistical formulations to estimate financial losses, ensuring appropriate victim redress, while evaluating crime severity and frequency to determine proportional imprisonment and fines. The model balances victim compensation and offender deterrence through probability-based risk assessment, aligning with modern cyber laws and forensic standards.

2.1 Cyber Threats By Likelihood Probability and Impact

The probability is classified as Very likely, Likely and unlikely and the impact is classified as Minor. Moderate and major in the scale of 1-4- low, medium, high, extreme as shown in the table 1.

Risk = Likelihood x Impact

The generalized approach to setting punishment and fines based on the Risk, severity and impact of each cybercrime is shown in table 1:

*Assessment of cyber Risk Impact: Risk exposure = P * I*

Where P is the probability of occurrence for a risk and I is the impact, impact is measured in terms of the cost to the software project due to cyber risk.

*I = Cd * C * S*

Where Cd = The cumulative count of custom-built components to be developed from scratch to avoid each cyber risk and C= Cost Of Each code (LOC) to be developed. and S= The Average Component Size In LOC.

Table 1: Probability and impact[2]

Next Generation cyber crime	Likelihood probability	Impact	Reason for impact
AI-Powered Attacks	Very Likely	4	Threat Severity Level: *High*. Critical, due to their potential to cause extensive disruption and compromise secured essential infrastructure.
IoT Exploits	Likely	3-4	Severity: *Moderate to high*, contingent on the scale of device compromise and the extent of resultant damage.
Cryptojacking	Likely	1	Severity: *Moderate*, but can lead to significant financial losses for victims.
Deep fakes	Likely	1-3	Severity: *Moderate to high*, depending on the intent and impact of the deceptive content
Ransomware	Likely	3	Severity Level: *High*, as May result in significant financial losses and operational disruptions,

			adversely affecting organizational functionality and individual systems.
Quantum Computing Threats	Very Likely	4	Severity Level: Very High, Critical, owing to the risk of compromising essential cryptographic mechanisms and exposing confidential information.
Metacrime	Very likely-likely	1-2	Threat Level: Dynamic/variable, contingent on the nature and scope of illicit cyber activities enabled by advanced technologies.

2.2 Quantitative Formulation for Cyber Victim Insurance Evaluation and Compensation

Cyber Victim Insurance :The formula for Cyber Crime Insurance Calculation based on the provided inputs and industry knowledge[2][3][26][13][14][15][17]:

CCI=(BR×IR)+(DR×LF)+(CR×CV)+(LR×LI)+(PR×PI)+CF ----------(1)

Where (i)CCI = Cyber Crime Insurance Premium (ii)BR = Business Revenue (Annual) (iii)IR = Industry Risk Factor (Based on sector vulnerability) (iv)DR = Data Records Stored (in millions) (v)LF = Legal & Compliance Factor (vi) CR = Cyber security Readiness Score (Inverse: Higher security reduces premium) (vii)CV = Cyber Vulnerability Exposure (viii) LR = Liability Risk (Past incidents & claim history) (ix) LI = Litigation Impact Factor (x) PR = Policy Risk Coverage (Extent of coverage required) (xi)PI = Premium Impact Multiplier (Based on selected coverage) (xii) CF = Constant Fixed Cost (Administrative & policy processing fees)

This formula integrates revenue, risk exposure, data volume, security measures, and legal liabilities to calculate a tailored cybercrime insurance premium.

Cyber Victim Compensation :A court or legislative framework for cybercrime victim compensation should incorporate key principles of financial, psychological, regulatory, and punitive assessments. Based on the provided model and legal considerations, the Cyber Victim Compensation Formula (CVC) can be structured as follows[4][5][6][10][11]12]:

Cyber Victim Compensation Formula (CVC)

TC = [(FL + PI + NL + LC + SF + DS + FC + HD + RV + RC + BL + PD) + (R * A) - BC - IC] * LP----------(2)

Where: (i)FL = Financial Loss (Monetary losses due to fraud, hacking, or theft) (ii)PI = Psychological Impact (Emotional distress and trauma compensation) (iii)NL = Negligence Liability (Proven negligence or security failures) (iv) LC = Legal Costs (Investigation and litigation expenses) (v) SF = Security Failures (Cost of upgrading cyber security) (vi)DS = Data Sensitivity (Severity of breached data) (vii) FC = Fraud Consequences (Restitution for identity theft and fraud recovery) (viii)HD = Harm Duration (Prolonged impact on victim's finances and reputation) (ix) RV = Regulatory Violations (Fines imposed for non-compliance) (x) RC = Recovery Costs (Forensic investigations, data restoration, and security upgrades) (xi) BL = Business Loss (Economic loss due to operational downtime) (xii)PD = Punitive Damages (For gross negligence or intentional misconduct) (xiii)R = Likelihood of Attack Occurrence (x iv)A = Adverse Impacts of the Attack (xv) BC = Breach Cost (Total cost to rectify the security breach) (xvi) IC = Insurance Coverage (Deductions covered under cyber insurance policies) (xvii) LP = Legal Precedents (Multiplier based on past court rulings for similar cases) (xviii) To relate the two formulas and express the cost the victim will receive in terms of both coverage and compensation, we can combine these concepts.

Victim's Compensation (VC)=(CCI–IC)+TC ----------(3)

Where:(i)CCI is the insurance coverage from the first formula (Cyber Crime Insurance Calculation Equation 1). (ii)IC is the Insurance Coverage as an offset (if applicable).

(iii) TC is the total compensation from the second formula (Cyber Victim Compensation Formula Equation 2).

Thus, the victim's compensation will be the sum of their insurance coverage minus any contributions or offsets, plus the total compensation based on their specific losses and damages. This combined approach ensures that the victim gets both insurance coverage based on rates and compensation for the actual financial, psychological, and other direct and indirect losses experienced.

2.3 Quantitative Model for Calculating Cybercrime Penalties: Imprisonment and Fines

Next-Generation Cybercrime Punishment Calculation[7][8][9]: Considering evolving cyber threats, the punishment formula should incorporate AI-driven attacks, quantum computing risks, and emerging cybercrime complexities such as deep fake frauds, ransom ware and AI-enhanced cyber threats. The refined punishment structure will integrate attack sophistication, AI involvement, data breach scale, and victim impact.

Cyber Risk Calculation Formula: Cyber risk is the potential for harm or loss resulting from cyber threats, including data breaches, cyber-attacks, and other online security incidents[46][47]

Risk Score=(L×I)+NSR+PRD+(AF–MF)+(ACS×2)+(DBS×3)

Where (i)L = Likelihood of Cyber Threat (1-5) (ii)I = Impact of Cyber Threat (1-5) (iii)NSR = National Security Risk (1 for No, 5 for Yes) (iv) PRD = Psychological and Reputational Damage (1-5) (v) AF =

Aggravating Factors (0-5) (vi)MF = Mitigating Factors (0-5) (vii) ACS = Attack Complexity Score (0-5) (viii) DBS = Data Breach Scale (1-5) (ix) Attack Complexity Score (ACS) considers(a)AI-powered hacking tools (+1) (b)Automated large-scale attacks (+2) (c)Quantum computing exploitation (+3) (d)Zero-day vulnerabilities used (+4) (e) Nation-state or organized groups, or state-sponsored actors APT (Advanced Persistent Threat) to critical infrastructures, defense systems, financial institutions, or political organizations involvement (+5) (x)Data Breach Scale (DBS) considers: (a)Less than 100 victims = 1 (b) 100 to 1,000 victims = 2 (c)1,000 to 10,000 victims = 3 (d) 10,000 to 100,000 victims = 4 (e) More than 100,000 victims = 5

Penalty for Cybercrime Attacker: Imprisonment and fines are imposed on hackers to (i) deter cybercrime, (ii) hold hackers accountable, (iii) provide justice for victims, (iv) recover damages, and (v) rehabilitate offenders. These penalties punish, deter, and ensure justice for victims. The exact penalties depend on the laws of the jurisdiction where the crime is committed and the severity of the offense.

Maximum Imprisonment Calculation: A cybercrime attacker may face jail time, depending on the severity of the crime[48][49][50].

$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ ----------(4)

Where (i)α= alpha =0.7 (coefficient for risk impact on imprisonment) (ii)β= Beta=0.00002 (financial damage multiplier) (iii) γ= Gama =2 (minimum base imprisonment in years)

(iv) Financial Damage (FD) :$FD=DL+IL+RC$

Where (a**)** Direct Losses (DL**)** arise from cybercrime through stolen funds, compensation for data breaches, and ransom payments to restore encrypted data. *DL=Stolen Funds+Ransom Paid*

(b)Indirect Losses (IL) result from business interruption and downtime, loss of customers due to reputational damage, and expenses incurred from legal fees and compliance requirements.

IL=Revenue Losses+Litigation Costs Compliance Penalties

(c) Recovery Costs (RC) include expenses for system recovery, incident response, data restoration, and security upgrades to prevent future attacks.

RC=System Restoration+ Security Hardening

Hence Imprisonment (MI) = (0.7×Risk Score)+(0.00002×FD)+2 ----(5)

Ensuring minimum imprisonment of 2 years, rounded to 2 decimal places.

Maximum Fine Calculation: Cyber attackers may also be required to pay fines, which can vary based on the nature and impact of the crime

$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ ----------(6)

Where (i) δ=delta = 7500 (higher coefficient per risk unit for next-gen threats) (ii)ϵ=epsilon = 1.5 (multiplier for financial damage) (iii)ζ== zeta = 1,00,000 (base fine for severe cyber offenses)

Ensuring a minimum fine of Rs.1,00,000, rounded to two decimal places.

Hence Fine (MF) =(7500×Risk Score)+(1.5×FD)+1,00,000 ----------(7)

This approach ensures proportionality in punishment based on threat sophistication, victim impact, and national security risks, making it more adaptable for future cyber threats.

3. STRENGTHENING INDIA'S CRIMINAL & CYBER LAWS: 2025 AMENDMENTS FOR NEXT-GEN. CYBER CRIMES

Judicial activism has helped courts apply legal and cyber laws to address emerging cybercrimes. However, the IT Act 2000/2008, BNS 2023, and BSA 2023 lack provisions to regulate AI-driven threats like deepfakes, ransom ware, and data breaches. This study identifies legal gaps and proposes reforms, including AI-based cybercrime detection, stronger evidence admissibility, digital identity protection, and cross-border jurisdiction.

3.1 Strengthening India's Cyber and Criminal Laws: 2024 Amendments for Next-Gen Cybercrime

This section explores the limitations of ITA 2000/2008 and prosed the amendments for next generation cyber-crimes[18].

3.1.1 Limitations in ITA 2000

The proposed amendments in ITA[29][31][32] establish comprehensive legal frameworks that encompass prevention, detection, punishment, and deterrence to effectively combat next-generation cybercrimes[18][19]. Each of these next-generation cybercrimes leverages advanced technology, presenting significant challenges to existing cyber security measures and requiring innovative approaches to detection, prevention, and mitigation. (i) The ITA 2000 does not cover AI-driven cybercrimes such as deepfake-based defamation, misinformation, and phishing attacks, leaving these threats unregulated. (ii) It lacks protection against quantum computing threats that can break encryption protocols and compromise sensitive information.(iii) There are no provisions to regulate AI-driven autonomous systems involved in cyber terrorism and critical infrastructure attacks.(iv) The Act does not address crypto jacking and crypto currency

mining.
(v) It remains silent on cyber espionage and state-sponsored attacks targeting sensitive government or private sector data.(vi) The ITA 2000 does not regulate unethical AI algorithms that violate privacy and exploit AI-generated content.(vii) Its limited provisions under Section 66F do not cover AI-based attacks on critical infrastructure or deepfake propaganda.(viii) There is no framework for validating and certifying AI-generated digital evidence, raising concerns about its admissibility in court.(ix) The Act lacks penalties for the misuse of AI in generating fake news, media manipulation, and compromising public trust. (x) It does not align with modern data protection laws[33] like DPDPA 2023, leaving AI-related privacy violations unchecked.(xi) The Act fails to address block chain-related frauds such as smart contract exploits and NFT manipulations.(xii) Its definitions are out-dated and do not cover emerging threats such as IoT attacks, smart device hacking, and metaverse-related crimes.(xiii) The ITA 2000, while foundational, lacks the necessary provisions to address next-generation cyber threats, requiring urgent amendments for comprehensive cyber protection[31].

3.1.2 Definition Sections For Next Generation Cybercrimes

Next-generation cybercrimes are probably AI-Powered Attacks, IoT Exploits, Crypto jacking, Deep fakes, Ransom ware 2.0, Quantum Computing Threats, Metacrime and the like. The definition shall be added into the definition section 2 of ITA 2000[1]
Section 2(wa): Definition of Cybercrimes Involving Emerging Technologies
"Cybercrime" shall include offenses that are committed using or involving emerging technologies such as AI, Deepfakes, IoT devices, and Blockchain technology.
Illustration: If an individual uses AI to create a Deepfake video that defames another person, or hacks an IoT device to cause physical harm, such acts shall be treated as cybercrimes under this Act.
Section 2(x): Definition of Digital Assets and Crypto currency
"Digital Assets" shall include crypto currencies, tokens, and any other form of digital property that can be stored, transferred, or exchanged electronically.
Illustration: If a person engages in fraudulent activities involving the transfer or sale of cryptocurrency, such acts shall be governed by this Act.

3.1.3 Amendment Based on Section 43 ITA (Compensation Clause)

Section 43 ITA (Compensation Clause) : Section 43 Penalty and Compensation for Unauthorized Access and Data Manipulation **(Amended by ITAA-2008).** Section 43, amended by ITAA 2008, imposes a penalty of up to one crore rupees for unauthorized access, alteration, or manipulation of data in a computer system or network. While it does not explicitly address next-generation threats, it broadly covers penalties and compensation, which may increase based on factors such as the attacker's profit, data breach impact, IPR losses, operational disruptions, reputational harm, legal expenses, investigation costs, regulatory fines, and insurance cover.
Section 43A – Compensation for Failure to Protect Data: Inserted via ITAA 2006 and amended by ITAA 2008, Section 43A mandates that a body corporate handling sensitive personal data that negligently fails to maintain security practices, causing wrongful loss or gain, shall compensate the affected person up to Rs. 5 crore.

43 A Compensation for failure to protect data (Inserted vide ITAA 2006): As per ITAA 2008, a body corporate handling sensitive personal data that negligently fails to maintain reasonable security practices, causing wrongful loss or gain, shall pay compensation up to Rs. 5 crore to the affected person
Cybercrime Victim Oriented Compensation : The proposed sections Section 43 B, Section 43 C , 43 D aim to address compensation for victims of next-generation cybercrimes within the infrastructure of IT Act, 2000

Section 43 B: Insurance Coverage for Victims of Next-Generation Crimes

(1) Insurance providers shall offer policies specifically designed to cover losses incurred by victims of next-generation cybercrimes.
(2) These insurance policies shall encompass various aspects, including financial losses, data breaches, identity theft, and other related damages resulting from cybercrimes targeting the next generation.
(3) The Central Government may establish guidelines to ensure the adequacy and effectiveness of insurance coverage for victims of next-generation cybercrimes. The Insurance Regulatory and Development Authority (IRDA) shall, in consultation with the Cyber Regulatory Authority, establish industry-specific risk factors (IR,LF,CV,LI,PI) to determine premium calculations based on cyber vulnerabilities.
(4) The total Cyber Victim Insurance shall be calculated using formula: :The formula for Cyber Crime Insurance Calculation based on the provided inputs and industry knowledge is :
$$CCI=(BR\times IR)+(DR\times LF)+(CR\times CV)+(LR\times LI)+(PR\times PI)+CF$$ --------*(as per Equation.1)*

Section 43 C - Compensation to Victims of Cybercrimes

(1) In addition to any other punishment under this Act, any victim of cybercrime, including financial fraud, identity theft, or data breaches, shall be entitled to compensation determined by the formula: (Equation 2)

$TC=[(FL+PI+NL+LC+SF+DS+FC+HD+RV+RC+BL+PD)+(R\times A)-BC-IC]\times LP$

And the court may, during sentencing, direct the offender to compensate the victim of the cybercrime based on the severity and impact of the cybercrime, the financial status of the offender, and any mitigating or aggravating circumstances[51][52].

(2) The compensation awarded under subsection (1) shall be determined based on the harm, injury, detriment, endured by the victim, including but not limited to financial losses, emotional distress, and reputational harm.

(3) The restitution mandated by the court shall be remitted by the perpetrator to the aggrieved party or victim within a designated timeframe, upon failure of which the court reserves the right to enforce payment via suitable legal recourse.

(4) Any disagreement concerning the sum or disbursement of restitution shall be settled by the court, and the determination of the court shall be conclusive and enforceable.

(5) The Victim's Compensation (VC)=(CCI−IC)+TC Formula(Equation 3) shall be used to calculate the compensation of the victim.

Section 43D - Creation of Victim Compensation Fund

(1) The government shall institute a Victim Compensation Fund to furnish monetary aid to victims of cybercrimes who have incurred substantial losses or damages.

(2) The Victim Compensation Fund shall be funded through appropriations from the government, contributions from convicted offenders as ordered by the court, and donations from public or private sources.

(3) The [relevant government department or authority] shall maintain records of all disbursements from the Victim Compensation Fund and report on its activities to the appropriate government authorities on a regular basis.

(4) If the victim is uninsured, the government shall establish a Cyber Compensation Fund **(CCF)** to assist individuals affected by cyber fraud. This fund shall be recovered from non-compliant entities under Section 125A of BNS, 2025**.**

3.1.4 Amendment to Section 66 for Cyber Fraud and Liability Expansion

Section 66 of the ITA 2000 prescribes imprisonment up to three years, a fine up to Rs. 5 lakh, or both, for anyone who, with dishonest or fraudulent intent, engages in unauthorized access, modification, or damage to data or computer systems as defined under Section 43. Add new section 66 A as below:

66A. Corporate Cyber Negligence

(1) Any organization failing to secure its digital infrastructure, leading to unauthorized access, data breaches, or financial fraud exceeding Rs.10 lakh, shall be liable for penalties under BNS Section 125 and shall compensate affected individuals based on their insured policy coverage under Section 72A ITA .(Section 72A of the ITA 2000 penalizes any person, including intermediaries, who discloses personal information without the consent of the concerned person and breaches a lawful contract, with punishment of imprisonment up to three years, a fine up to Rs. 5 lakh, or both.)

(2) If the entity is uninsured, the penalty shall be calculated as:

$P= 2\times(CCI)+damages\ claimed\ by\ victims$

(3) Directors, compliance officers, and cyber security heads of the violating entity shall be subject to imprisonment up to 5 years or a fine of Rs.5 crore, or both.

3.1.5. Cybercrime Punishment Assessment

Section 66A, which penalized sending offensive messages through communication services, was declared unconstitutional by the Supreme Court of India in the landmark case:

*Shreya Singhal v. Union of India, (2015) 5 SCC 1.*The Proposed Amendments to the IT Act, 2000 shall be made by introducing new section 66 G for next generation cybercrimes.

Insertion of Section 66G: Enhanced Punishment for Aggravated Cyber Crimes

(1) Any person who commits cybercrimes of a grave nature that result in:

(a) National security threats, cross-border cyber terrorism, or large-scale financial fraud;

(b) Psychological harm or reputational damage exceeding threshold levels;

(c) Breach of critical infrastructure, including power grids, healthcare systems, and defense networks shall be punished with imprisonment and fine as per the following:

(i) Maximum Imprisonment Calculation:

$MI=(0.5\times Risk)+(0.00001\times FD)+1$ Where:

- Risk = (L × I) + NSR + PRD + (AF - MF)

The imprisonment shall not exceed life imprisonment in case of threats to national security and mass-scale financial fraud.

(ii) Maximum Fine Calculation:

$MF=(5000\times Risk)+(1.2\times FD)+50000$

Where FD is financial damage in rupees.

The minimum fine shall be Rs. 50,000, and the maximum shall be Rs. 10 crore or three times the financial loss, whichever is higher.
(2) If the cybercrime is committed by a group, organized criminal syndicate, or an entity with foreign collaboration, the punishment shall be doubled.
(3) Repeat offenders shall be subject to an additional 5 years imprisonment beyond the calculated MI and an additional fine of Rs. 1 crore.
Insertion of Section 72B: Punishment for Breach of AI-based Cyber Attacks and Machine Learning or Quantum Cyber Crimes
(1) Any person who uses artificial intelligence, machine learning, or quantum computing to execute cyber attacks, including but not limited to AI-driven identity theft, misinformation campaigns, or quantum hacking of encryption systems, shall be punished as follows:
(a) Imprisonment: Imprisonment shall be calculated using the formula:
MI = (0.7 × Risk) + (0.00002 × FD) + 2 (As per equation 5)

- Minimum imprisonment shall be 5 years, and the maximum may extend to 20 years or life imprisonment if the act endangers national security.

(b) Fine:The fine shall be determined using the formula
MF = (10,000 × Risk) + (1.5 × FD) + 1,00,000 (As per Equation 7)
With minimum fine shall be Rs. 1 lakh, and the maximum may extend to Rs. 50 crore or five times the financial damage, whichever is higher.
(2) If the cybercrime disrupts national elections, democratic processes, or financial markets, the punishment shall be life imprisonment and seizure of digital assets of the perpetrator.
H Amendment in ITA for next Generation Cyber Crimes Punishment.

The proposed sections for punishment for handling next-generation cybercrimes within the framework of rules, regulations, or principles of ITA 2000
Punishment Clause ITA- Section 70 – Protected System: Any person who gains or attempts to gain unauthorized access to a protected system shall be punished with imprisonment for a term extending up to ten years and shall also be liable to a fine. Accordingly determining the punishment and fine for next-generation cybercrimes should consider various factors, including the severity and impact of the offense, as well as the intent and culpability of the attacker.
On the basis of Table 1 and punishment formulae (Insertion of Section 66G: Enhanced Punishment for Aggravated Cyber Crimes): The amendment in Section 70. Protected system shall be done as below[1][22]:
Section 70 A : Prohibition of AI-Powered Attacks: Any individual who maliciously utilizes artificial intelligence or machine learning algorithms to initiate cyber-attacks shall face punitive measures, including imprisonment for a term ranging from 5 to 15 years and a fine ranging from INR 20 lakhs to INR 1 crore, depending on the scale and impact of the attack, or both.
Section 70B - Offenses Relating to IoT Exploits: Any person who exploits IoT devices or networks for malicious purposes shall face punitive measures, including imprisonment for a term ranging from 4 to 10 years and a fine ranging from INR 5 lakhs to INR 50 lakhs or Both Section 70 C - Prohibition of Crypto jacking: Any person who unlawfully utilizes computing resources for crypto currency mining without authorization shall be punished with imprisonment for a term ranging from 2 to 7 years and a fine in the range of INR 3 lakhs - INR 30 lakhs at the discretion of the court[53].
Section 70 D - Offenses Related to Deepfakes: Any person who creates or disseminates deceptive or fraudulent media content generated using deep learning techniques shall be punished with imprisonment for a term ranging from 2 to 7 years and a fine ranging from INR 3 lakhs to INR 30 lakhs or a fine at the discretion of the court[54].
Section 70 E - Criminalization of Ransom ware: Any person who deploys ransom ware to encrypt data or disrupt systems for financial gain shall be punished with imprisonment of either description for a term in the range of 5-15 years and/or a fine of INR 10 lakhs to INR 1 crore at the discretion of the court[55] .
Section 70 F - Prevention of Quantum Computing Threats:Any person who maliciously exploits quantum computing technology[23] for cyber-attacks on encryption algorithms or sensitive data shall be punished with imprisonment for a term ranging from 10 to 20 years and a fine ranging from INR 50 lakhs to INR 5 crores or Both at the discretion of the court[56].
Section 70G - Metacrime Offenses: Any person who engages in criminal activities facilitated by emerging technologies and digital platforms shall be punished with imprisonment for a term ranging from 3 to 7 years and a fine ranging from INR 50 lakhs to INR 5 crores or Both at the discretion of the court[26][57].

3.1.6. Dynamic Amendments in ITA

Section 43A(1A): Integration with Digital Personal Data Protection Act (DPDPA) for Strengthening Data Protection and Privacy[33]: Everybody corporate handling sensitive personal data shall comply with the provisions of the Digital Personal Data Protection Act, including but not limited to obtaining consent, ensuring data security, and reporting breaches.
Illustration: If a company collects biometric data without obtaining explicit consent and fails to secure it, leading to a breach, it shall be liable under this Act.

Section 43B: Right to Be Forgotten : An individual shall have the right to request the removal of their personal data from any online platform, subject to conditions as prescribed[58].
Illustration: If an individual finds that their personal information, such as photographs or contact details, is being misused online, they can request its deletion under this section.
Following two sections namely Section 66F(2): & Section 66G should be added for expanding Cyber security Obligations
Section 66 G: Mandatory Cyber security Measures Every organization engaged in online activities shall implement cyber security measures as prescribed by the Central Government. Failure to comply shall attract penalties, including fines and imprisonment[59].
Illustration: If a financial institution fails to secure its online banking system, resulting in unauthorized access to customer accounts, it shall be penalized under this section.
Section 66 F: Cyber security Incident Reporting: Every organization shall report any significant cyber security incident to the designated authority within 72 hours of its occurrence, failing which it shall be subject to penalties as prescribed[59].
Illustration: If a company's database is hacked, and it fails to report the breach within the stipulated time, it shall be liable for penalties under this section.
To address Content-Related Offenses Section 67C & Section 67D for multimedia data-image , audio and video.
Section 67D: Combatting Deep fakes and Manipulated Media : Any person who creates, distributes, or uses manipulated digital media, including Deepfakes, with the intent to harm, defraud, or mislead others, shall be punishable with imprisonment up to three years and a fine[24][60].
Illustration: If a person creates a Deep fake video of a public figure to defame them, they shall be prosecuted under this section.
Illustration: If a person spreads false news online that leads to communal unrest, they shall be liable under this section.
Section 67E: Protection Against Child Exploitation: Any person who engages in the production, distribution, or consumption of child pornography, or who engages in cyber stalking or grooming of a minor, shall be punishable with imprisonment up to seven years and a fine[61].
Illustration: If a person uses online platforms to groom a child for exploitation, they shall be prosecuted under this section.
Section 67F: Online Safety Education for children :The Central Government shall mandate the inclusion of online safety education in the curriculum of schools and colleges, to raise awareness about the dangers of cybercrimes[62].
Illustration: Schools shall include modules on identifying and reporting cyber bullying as part of their curriculum under this section.
Section 78A: Digital Evidence Handling for Strengthening Law Enforcement Powers: The collection, preservation, and presentation of digital evidence shall adhere to guidelines as prescribed by the Central Government. Any evidence not in compliance shall be deemed inadmissible in court[63].
Illustration: If law enforcement fails to properly secure digital evidence from a suspect's computer, such evidence may be excluded from the trial under this section.
Section 79B: Refined Intermediary Liability: Intermediaries shall not be liable for third-party information, data, or communication links made available by them, provided they adhere to guidelines prescribed by the Central Government for monitoring and removing unlawful content[64].
Illustration: If a social media platform fails to remove content promoting violence after receiving a valid takedown notice, it may be held liable under this section.
Section 79B: Algorithm Accountability : Online platforms utilizing algorithms for content moderation or user targeting shall ensure transparency and shall be accountable for the outcomes of such algorithms.
Illustration: If an online platform's algorithm unfairly targets users based on biased criteria, the platform may be required to provide explanations and could face penalties under this section[65][66].
Section 66H: Addressing E-Commerce Fraud for Consumer Protection in the Digital Space :Any person who engages in fraudulent practices during online transactions, including false representations, misleading advertisements, or unauthorized charges, shall be punishable with imprisonment up to three years and a fine[67].
Illustration: If a vendor on an e-commerce platform sells counterfeit goods while representing them as genuine, they shall be liable under this section.
Section 66I: Cyber Security Certification: No software or hardware product shall be allowed to enter the market without obtaining a cyber security certification from a recognized authority, ensuring it meets prescribed security standards.
Illustration: A company selling IoT devices without proper security certifications may face penalties under this section.
For Strengthening Penalties and Deterrence Section 66J and Section 66K shall be added as below:

Section 66J: Enhanced Penalties for Cybercrimes

Any person committing a cybercrime that results in significant financial loss, harm to national security, or public safety, shall be subject to enhanced penalties, including imprisonment up to ten years and a fine.
Illustration: If a cybercriminal hacks into a financial institution's system causing substantial financial loss, they shall face enhanced penalties under this section.
Section 66K: Asset Seizure and Forfeiture : The Central Government shall be empowered to seize and forfeit assets derived from cybercrimes, including digital assets, properties, and monetary gains[68].
Illustration: If a hacker amasses wealth through illegal online activities, such assets may be seized under this section.
These sections aim to address the complexities of modern cybercrimes while ensuring that the Information Technology Act, 2000 remains relevant in the face of rapidly evolving technological threats.
International Jurisdiction and Cooperation: The proposed section on International Jurisdiction and Cooperation shall be done by expanding Section 87 ITA 2000:. Power of Central Government to make rule shall be extended to the following:

Section 87 A. International Jurisdiction and Cross-Border Cooperation[68].

(a) Jurisdiction within the purview of this Act shall vest in the courts of India concerning offenses committed through electronic means which affect Computing Infrastructure, Cyber Ecosystem, Information Matrix of network located within the territory of India, or any data or information residing therein.
(b) The stipulations outlined within this Act shall be enforceable to offenses committed outside the territorial boundaries of India, if such offenses have had an adverse effect within the territory of India.
(c) Notwithstanding anything contained in any other law, this Act shall apply to any person irrespective of their nationality or location at the time of commission of an offense, if such offense involves electronic transactions, data breaches, or cybercrimes having a detrimental impact within the territory of India.
(d) The Central Government may, by statutory instrument, specify the conditions under which this Act shall apply extraterritorially.
(e) The Central Government may enter into agreements or treaties with foreign governments or international organizations for the purpose of mutual legal assistance in relation to electronic transactions, cybercrimes, and cyber security. The Central Government may enter into agreements with foreign governments for the purpose of facilitating cross-border investigations and prosecutions related to cybercrimes.
Illustration: If a cybercriminal based in another country hacks into an Indian bank's database, the Indian authorities may collaborate with the foreign government to investigate and prosecute the offense.
Such agreements may include provisions for the exchange of information, evidence, and assistance in gathering electronic evidence, as well as extradition arrangements, to facilitate effective cooperation in combating cyber threats.
(f) The Central Government reserves the authority, through official publication in the Official Gazette, to designate foreign governments or international organizations with which India intends to cooperate in matters relating to electronic transactions, cybercrime prevention, and cyber security.
(g) The Central Government, in accordance with the regulations set forth in this Act, negotiate and conclude agreements or treaties with such designated entities to promote mutual cooperation and collaboration in combating cyber threats and enhancing cyber security measures.
(h) In interpreting the stipulations of this legislation, due regard shall be given to international standards, conventions, and best practices relating to electronic transactions, cybercrime prevention, and cyber security.
(i) The regulations set forth in this Act shall be binding in a manner consistent with the principles of international law and with a view to promoting cooperation and collaboration among nations in addressing transnational challenges arising in the digital domain.

3.1.7 Digital Forensic Process, Promoting Public-Private Partnerships, And Fostering Digital Literacy

The amendments advocate for proactive measures such as establishing digital forensic process, promoting public-private partnerships, and fostering digital literacy to empower citizens against cyber threats[20][21][68][69][70][71].

Section 87B: Digital Forensic Investigation Procedures

(1) The Central Government shall prescribe protocols for conducting digital forensic investigations concerning offenses under this Act or related electronic evidence.
(2)The Central Government shall reserve the authority to delineate the requisite qualifications, experience, and training benchmarks essential for digital forensic investigators, ensuring adeptness and precision in investigative practices.
(3) The Central Government shall establish standards for Cyber forensic Investigation model[20] for the collection, preservation, examination and analysis of digital evidence objects, evidence to ensure its admissibility with Authenticity , Integrity Reliability in judicial proceedings.

Section 87C: Public-Private Cyber security Partnerships

(1)The Central Government shall facilitate and promote partnerships between governmental bodies, corporate entities, and non-governmental organizations to enhance cyber security capabilities[21]

(2) The Central Government may establish mechanisms for the sharing of threat intelligence, collaborative analysis of cyber threats, and joint efforts to address vulnerabilities in cyberspace.

(3) The Central Government shall encourage the participation of relevant stakeholders in cyber security initiatives and initiatives aimed at promoting cyber resilience.

Section 88D: Digital Literacy and Cyber security Awareness Promotion

(1) The Central Government shall take measures to promote digital literacy and cyber security awareness among the general public, businesses, and other stakeholders for cyber crimes, social media crimes and next generation crimes.

(2) The Central Government may organize educational programs, training sessions, and awareness campaigns to impart knowledge on safe and secure practices in cyberspace.

(3) The Central Government shall collaborate with relevant authorities and organizations to develop and disseminate informational materials on cyber security best practices and emerging threats.

These sections, when incorporated into the IT Act 2000, establish a legislative structure for addressing digital forensics, cyber security response, public-private partnerships, and digital literacy initiatives in the context of emerging cyber threats.

3.2 Proposed Amendments In BNS 2023

The BNS 2023 represents a significant update to India's criminal law[34], but it may have some gaps or provisions that could be perceived as missing or inadequately addressed areas for cybercrimes.

3.2.1 Inadequately Addressed Potential Areas in BNS 2023

The BNS 2023, while modernizing India's criminal justice system, has significant gaps in addressing next-generation cybercrimes. The following are key limitations that highlight the need for urgent amendments[35][36].

(i) The absence of specific provisions for AI-driven crimes and deep fake technology is a critical gap. With the rise of AI-generated misinformation, automated hacking, and deep fake-based identity fraud, the BNS does not define these threats or establish penalties, making enforcement difficult.

(ii) Cyber warfare and state-sponsored cyber attacks remain unaddressed, leaving India's national security vulnerable. Without legal recognition of cyber espionage, digital sabotage, and AI-powered cyber attacks, law enforcement agencies lack the necessary tools to prosecute offenders.

(iii) While hacking and online fraud are criminalized, the BNS fails to explicitly cover ransom ware 2.0, crypto jacking, and crypto-based financial frauds. These cyber extortion tactics exploit cryptocurrency transactions and decentralized finance (DeFi) platforms, yet the law does not provide clear legal mechanisms to prosecute such offenses.

(iv) Data protection and digital privacy remain inadequately addressed. Unlike global data protection laws, the BNS does not regulate biometric data breaches, unauthorized mass surveillance, or misuse of personal data, creating a weak privacy framework.

(v) A major concern is the lack of legal clarity on dark web activities and quantum computing threats. The dark web facilitates illicit trade, drug trafficking, and cyber-attacks, yet the BNS does not include specific legal provisions for its regulation. Similarly, quantum computing could break traditional encryption, posing new risks, but there is no legal framework for such futuristic threats.

(vi) Punishments for cyber offenses remain lenient. The absence of graded sentencing and mandatory minimum penalties for large-scale financial frauds, identity theft, and AI-powered cybercrimes reduces deterrence, allowing cybercriminals to exploit legal loopholes.

(vii) Cybercrime enforcement is further weakened by jurisdictional challenges and lack of international cooperation. Given the borderless nature of cyber offenses, the BNS does not provide a clear legal framework for cross-border investigations, digital evidence sharing, or extradition in cybercrime cases. Without international coordination mechanisms, law enforcement agencies struggle to tackle global cyber threats effectively.

(viii) The BNS does not address security risks related to IoT (Internet of Things) and critical digital infrastructure. With increasing dependence on IoT devices, medical equipment, and smart city technologies, cyber attacks on these systems could have severe consequences, yet no specific safeguards are mentioned in the law.

(ix) Beyond cybercrime, the BNS lacks clarity on community service penalties, human rights protections, and victim support mechanisms. It does not provide structured guidelines for community service sentencing under the BNSS, 2023, nor does it emphasize victim compensation, rehabilitation, or counselling services for cybercrime victims.

(x) Economic offenses such as large-scale corporate frauds, financial scams, and corruption are not comprehensively addressed, leaving gaps in corporate liability enforcement.

3.2.2 Amendments In BNS For Inadequately Addressed Potential Areas

Based on the concerns outlined for the BNS 2023, The proposed amendments to address the identified gaps are.

Section 2 (40): Definitions and Jurisprudence

(1) Definitions for terms used in this Act shall be clearly articulated to avoid ambiguity and ensure consistent interpretation and application.
(2) The Act shall provide for the development of jurisprudence through judicial precedents and case law to guide the application of its provisions.
(3) Regular reviews and updates to definitions and provisions shall be conducted to ensure alignment with evolving legal standards and societal needs.

Section 2 (41): Definition of Social Welfare Offenses: For the purposes of this Act, "social welfare offenses" shall refer to minor violations that do not pose a significant threat to public safety or order. Such offenses may include, but are not limited to, minor regulatory infractions, non-compliance with local ordinances, or other low-level offenses deemed appropriate by the court.

Under chapter II of Punishment : Amendment to Section 9 BNS Limit of punishment made up of several offences Shall be extended for modern and next Generation cybercrimes using following formulation:
$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ *(Using Equation 4)*
Maximum Fine Calculation: Cyber attackers may also be required to pay fines, which can vary based on the nature and impact of the crime
$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ *(Using Equation (6))*

Section A1: Cybercrime and Digital Offenses :(1) Any person who, through electronic means or digital communication, commits acts including unauthorized access to computer systems, hacking, online fraud, or identity theft shall be punishable with imprisonment for a term which may extend to seven years, or with a fine which may extend to Rs.5,00,000, or with both.
(2) The provisions under this section shall include measures for the preservation and handling of digital evidence in accordance with prescribed guidelines.
(3) Definitions for terms such as "hacking," "online fraud," and "identity theft" shall be consistent with international standards for digital offenses.

Section B1: Data Protection and Privacy

(1) Any individual or entity that illegally gathers, processes, or distributes personal data without the data subject's consent shall be liable to imprisonment for up to five years, a fine not exceeding Rs.3,00,000, or both
(2) Organizations handling personal data must implement security measures to prevent unauthorized access and breaches, and must report any data breaches to the relevant authorities within 72 hours.
(3) Comprehensive provisions on data subject rights, including access, rectification, and erasure of personal data, shall be stipulated in the data protection framework.

Section 8(4): Guidelines and Parameters for Community Service as Punishment

To effectively implement community service under section 4(f) as a punishment under the a (BNS), clear guidelines and parameters are necessary. Below are proposed parameters that could be considered for deciding the manner and term of community service as a punishment:
Section 8(4) may be extended to consider the Parameters for Community Service Punishment under BNS and section may be added into the section 8(4) as below:

Amended Section 8(4) of the BNS, 2023

Section 8(4) (a): Guidelines and Parameters for Community Service as Punishment

Section 8(4)(a) Nature and Severity of the Offense :(i) The community service imposed shall be commensurate with the nature and severity of the offense committed. For minor offenses, the scope and severity of the service shall be limited, with tasks proportionate to the seriousness of the offense.(ii) In cases of repeated offenses or a demonstrated pattern of behaviour, the term of community service may be extended, and the tasks assigned shall reflect the increased seriousness of the conduct.
(b) Impact on the Victim and Society :(i) The community service imposed shall be designed to provide direct or indirect benefits to the victim or the community adversely affected by the offense.(ii) The service may include tasks that aim to repair the harm caused by the offender, promoting a sense of accountability and restorative justice.
(c) Offender's Background and Skills :(i) The nature of the community service shall take into consideration the offender's skills, expertise, and background, thereby ensuring that the service performed is meaningful and rehabilitative. (ii) The court shall, where feasible, assign tasks that can contribute to the offender's reintegration into society, enhancing their potential for rehabilitation.

(d) Duration of Service :(i) The duration of community service shall be proportional to the offense, with minor offenses warranting a term of 20-100 hours, and more severe offenses warranting a term of up to 500 hours.
(ii) The court may exercise discretion in adjusting the duration of the service based on the offender's circumstances and the specific nature of the offense.
(e) Supervision and Monitoring :(i) All community service orders shall be subject to supervision by court-appointed supervisors to ensure compliance with the terms of the service. (ii) Supervisors shall submit regular progress reports to the court detailing the offender's adherence to the community service order.
(f) Location and Type of Service :(i) The location and type of community service shall be determined based on the needs of the community where the offense occurred, with priority given to tasks that address local issues. (ii) The service shall be assigned at a location accessible to the offender, considering their transportation means and personal circumstances.
(g) Compliance and Penalties :(i) Failure to comply with the community service order shall result in additional penalties, including but not limited to the conversion of the remaining service hours into a monetary fine or the imposition of additional service hours. (ii) Offenders demonstrating exemplary compliance with the service order may be eligible for a reduction in the service hours or early termination of the service.
(h) Public Awareness and Education :(i) Offenders may be required to participate in public service announcements or campaigns to raise awareness about the offense committed and its societal impact. (ii) As part of their community service, offenders may be mandated to attend or conduct educational workshops focused on preventing similar offenses within the community.
(i) Judicial Discretion :(i) The court shall have the discretion to customize community service orders based on the specific circumstances of each case, ensuring that the punishment is just, fair, and effective in achieving both punitive and rehabilitative objectives.
(j) Post-Service Evaluation: (i) Upon completion of the community service, the offender shall be subject to an assessment to determine the extent of their rehabilitation and the risk of reoffending. (ii) The court may impose follow-up requirements or additional check-ins to ensure the long-term effectiveness of the community service in preventing recidivism.
Section 8(5): Social Welfare Offenses: Upon conviction for a social welfare offense, the court may impose Monetary penalties proportionate to the severity of the offense other than imprisonment. Such penalties may include: (1) Mandatory participation in community service activities as determined by the court, aimed at benefiting the community and promoting the offender's reintegration into society. (2) The court may order restorative measures, including but not limited to, apologies to affected parties, restitution, or participation in rehabilitation programs.(3) In adjudicating penalties for social welfare offenses, the court shall emphasize restorative justice principles, aiming to redress harm, foster offender accountability, and alleviate judicial system burdens through non-custodial measures. (4)The court shall exercise discretion in categorizing offenses as social welfare offenses, considering factors such as the offender's intent, the nature of the harm caused, and the potential for rehabilitation.(5)Any decision categorizing an offense as a social welfare offense, or the penalties imposed under this section, shall be subject to review and appeal . (6)The State shall implement guidelines to monitor the effectiveness of penalties imposed under this section and shall periodically review these guidelines to ensure they align with the objectives of restorative justice and community welfare.
These sections provide a comprehensive legal framework for the imposition, execution, and evaluation of community service as a form of punishment under the BNS, ensuring that the process is fair, rehabilitative, and aligned with the principles of restorative justice.

Section C1: Human Rights and Fundamental Freedoms

(1) No provision of this Act shall be construed to infringe upon the fundamental rights guaranteed under the Constitution of India, including freedom of speech and expression, provided such rights are exercised within the bounds of lawful restrictions.
(2) Any person who is subjected to unfair treatment or denial of due process under this Act may seek redress through a review petition before the High Court.
(3) Provisions ensuring the protection of individual rights during criminal proceedings, including fair trial guarantees and protection against arbitrary detention, shall be strictly adhered to.

Section D1 Protection of Vulnerable Groups

(1) Any person who commits an offense involving violence, exploitation, or abuse of women, children, or other vulnerable groups Shall be liable to incarceration for a term not exceeding ten years, a monetary penalty not exceeding Rs.7,00,000, or both.
(2) Specific provisions shall be made for the prevention of trafficking, exploitation, and abuse of children, including special protection measures and support services.
(3) Detailed procedures for reporting, investigating, and prosecuting offenses against vulnerable groups shall be outlined in supplementary regulations.

Section E1 Economic Offenses

(1) Any person or corporate entity involved in economic offenses including fraud, embezzlement, corruption, or other financial crimes Shall be liable to detention for a period not exceeding fifteen years, a monetary penalty not exceeding Rs.10,00,000, or both.
(2) Corporate entities shall be held liable for economic offenses committed by their employees or agents, and penalties may include corporate fines and disqualification from conducting business.
(3) Provisions for the recovery of assets and compensation for victims of economic crimes shall be included.

Amendment to section 48 :Section 48 (A) Inter-Jurisdictional Coordination

(1) For offenses involving cross-border elements, the Act shall facilitate international cooperation, including extradition and mutual legal assistance, in accordance with international treaties and agreements.
(2) Provisions for interstate coordination on criminal matters, including sharing of information and resources, shall be established to ensure effective law enforcement.
(3) Procedures for handling cross-border crimes and cooperation with international agencies shall be detailed in supplementary regulations.

3.2.3 Causing Death: Cyber Crimes Attacks On Medical Devices

Extension of Section 100(Culpable homicide) of BNS, 2023: Cybercrimes Causing Death via Attacks on Medical Devices[37[38][39]
Amended Section 100A: Cybercrimes Causing Death by Tampering with Medical Devices
(1)Whoever, by the commission of any cybercrime, intentionally or knowingly tampers with, manipulates, or disrupts the functioning of any medical device or system, thereby causing the death of a person, shall face a life sentence or rigorous detention for a period not exceeding twenty years and shall also be subject to a monetary penalty using following formulation.
$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ *(Using Equation 4 Imprisionment)*
$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ *(Using Equation (6) Fine)*
(2) For the purposes of this section, cybercrimes involving medical devices include, but are not limited to:
(a) Infusion Pumps: Any unauthorized access or interference with the dosage settings of infusion pumps, resulting in the cessation of necessary drug delivery or administration of incorrect dosages, leading to the death of the patient.
(b) Ventilators and Respiratory Devices: Any act of hacking or manipulation of ventilators or respiratory devices that results in the reduction of oxygen supply or the cessation of the device, causing asphyxia or other life-threatening conditions leading to death.
(c) Oxygen Supply Systems: Any cyberattack targeting the control systems of centralized oxygen supply networks in a healthcare setting, causing disruption or alteration in the oxygen flow, leading to asphyxia and the subsequent death of patients.
(d) Medical Device Firmware and Software: Any malicious alteration or exploitation of software vulnerabilities in medical devices that cause the device to malfunction or operate incorrectly, resulting in the death of a patient. For instance, tampering with the firmware of a ventilator causing inconsistent breaths leading to hypoxia and asphyxia.
(e) Patient Monitoring Systems: Any unauthorized access to patient monitoring systems that leads to the display of incorrect vital signs data, causing delayed or inappropriate medical responses, ultimately resulting in the death of the patient.
(3) In cases where multiple deaths occur as a result of a single cyberattack on a medical device or system, the offender shall be liable for each death individually under this section.
Illustration: A cybercriminal gains unauthorized access to a hospital's network and alters the dosage settings of an infusion pump connected to a patient, causing the administration of a fatal dose of medication. The patient succumbs to the overdose. The cybercriminal, by his actions, has caused the death of the patient and is liable to be prosecuted under Section 100A of the BNS, 2023.
This extension of Section 100 is crucial in recognizing and addressing the growing threats posed by cybercrimes targeting the healthcare sector, where the manipulation of life-saving devices can result in fatal consequences.

3.2.4. Cyber Crimes In Elections Of India

The BNS 2023 lacks specific provisions for cyber offenses related to the security of electronic voting systems. This oversight is critical given the growing reliance on technology in elections. International research underscores vulnerabilities in software, internet connectivity, and the risk of hacking; highlighting the need for the BNS to address these issues and aligns with global best practices.
Software and Firmware Security: The BNSA lacks provisions for protecting the software and firmware of electronic voting machines (EVMs) from cyberattacks that can manipulate vote counts or compromise system integrity.
Internet Connectivity Risks: The Act does not address the risks associated with internet connectivity of EVMs, leaving them vulnerable to hacking, as highlighted by international incidents like the 2016 U.S. election breaches.

Hacking of EVMs: Research shows EVMs are susceptible to hacking that can alter election outcomes. The BNS lacks specific legal measures to address and prevent such security threats.
International Best Practices: The BNS does not align with international standards for electronic voting security, such as regular audits and secure development practices, potentially weakening election security.

Section 177 BNS Failure to keep election accounts shall be amended as below:
Section 177A: Security of Electronic Voting Machines (EVMs)
Section 177A (1): "Any person who, through unauthorized means, compromises the software, firmware, or hardware of electronic voting machines (EVMs) shall be punishable with imprisonment for a term which may extend to five years, or with a fine which may extend to INR 5,00,000, or with both. This includes unauthorized access, manipulation, or alteration of the voting data."
Section 177A (2): "The Election Commission of India shall ensure that regular security assessments and updates are conducted on the software, firmware, and hardware of EVMs. The findings of such assessments shall be documented and made available for audit by authorized bodies."
Insertion of Section 177B: Internet Connectivity and Cybersecurity Measures
Section 177B (1): "The Election Commission of India shall implement comprehensive measures to secure the internet connectivity of electronic voting systems against unauthorized access, hacking, and data breaches. This includes the establishment of secure communication channels and encryption protocols."
Section 177B (2): "Any person found guilty of hacking or attempting to hack into electronic voting systems or their internet connectivity shall be punishable with imprisonment for a term which may extend to seven years, or with a fine which may extend to INR 10,00,000, or with both."
Insertion of Section 177C: Penalties for Tampering with Electronic Voting Systems
Section 177C (1): "Any person who tampers with, manipulates, or otherwise interferes with electronic voting machines or related systems with the intent to alter election outcomes shall be punishable with imprisonment for a term which may extend to ten years, or with a fine which may extend to Rs.15,00,000, or with both."
Section 177C (2): "This section applies to all forms of tampering, including physical, digital, and network-based interference, and includes any act that disrupts or compromises the electoral process."
Insertion of Section 177D: Alignment with International Standards
Section 177D (1): "The provisions related to the security of electronic voting systems under this Act shall be aligned with international best practices and standards for electoral security, including but not limited to secure software development, regular security audits, and stringent access controls."
Section 177D (2): "The Election Commission of India shall periodically review and update its security protocols for electronic voting systems to ensure compliance with evolving international standards and technological advancements."
These new sections are designed to address cybercrimes related to electronic voting systems, ensuring robust security measures and alignment with global standards to protect the integrity of elections under the Bharatiya Nyaya Sanhita Act, 2023.

3.2.5. Cyber Crimes About Religions On Social Media

Cybercrimes related to social and religious issues on social media in India have been a significant concern over the past decade. These crimes often involve misinformation, hate speech, and defamation, impacting communal harmony and individual rights. Some examples and aspects related to these cybercrimes are:
Fake News and Misinformation: Fake news and misinformation involve spreading deceptive or misleading content intended to manipulate public perception. This often includes fabricated narratives or distorted facts, causing widespread alarm, confusion, or harm.
Illustrative Examples : Kerala Floods (2018): False claims and exaggerated reports about the extent of the damage and the involvement of different groups were spread via social media. For instance, some posts falsely claimed that certain communities were hoarding relief supplies, which led to communal tensions and distrust among affected populations.
Delhi Riots (2020): During the Delhi riots, social media platforms were used to spread false information about attacks on specific communities. Videos and images that were either doctored or taken out of context were shared to incite violence and deepen communal divides.
Hate Speech and Communal Tensions : Hate speech involves language that disparages or incites violence against individuals or groups based on attributes such as religion, ethnicity, or nationality. It often exacerbates communal tensions and can lead to real-world violence.
Illustrative Examples: Cow Vigilantism (2018): Social media was used to spread provocative messages and videos accusing individuals of cow slaughter. This led to physical attacks and killings by self-styled cow vigilantes targeting those accused of slaughtering cows, which heightened communal tensions.
Love Jihad Claims (2019): Social media campaigns propagated the idea of "love jihad," alleging that Muslim men were attempting to convert Hindu women through marriage. This led to harassment and violence against interfaith couples and heightened religious intolerance. Defamation and Targeted Harassment : Defamation involves the publication of false statements about an individual or group that damages their

reputation. Targeted harassment refers to deliberate and sustained attacks against individuals based on their personal characteristics or beliefs, often carried out online.
Examples are Propagation of False Allegations (2020): Social media was used to falsely accuse public figures or individuals of misconduct or criminal activities, leading to their reputational damage and public outrage. For instance, fabricated claims about politicians engaging in corrupt practices were widely shared, affecting their public image.
Tweets Against Religious Figures (2021): Defamatory content targeting religious leaders or communities was circulated on social media, leading to widespread outrage and violence. For example, derogatory remarks about prominent religious figures resulted in protests and communal clashes.
Propaganda and Extremist Content : Propaganda and extremist content involve the use of social media to promote radical ideologies or recruit individuals for extremist activities. This often includes content that incites violence or spreads extremist views under the guise of religious or political agendas.
For example Examples: Hate Speech by Extremist Groups (2019): Extremist groups used social media to spread radical messages and recruit followers. For example, videos and posts promoting violent jihadist ideologies were shared, leading to increased radicalization and recruitment of individuals to extremist causes.
These examples illustrate how cybercrimes related to social and religious issues on social media can impact communal harmony and individual rights in India. Tackling these challenges demands an integrated strategy incorporating legal frameworks, technological advancements, and public education.

Section 302 BNS uttering words etc with deliberate intent to wound religious feelings of any person shall be extended as below:

Section 302A - Dissemination of Fake News and Misinformation

"Whoever, with intent to deceive or mislead the public, disseminates false or misleading information via electronic communication or social media, resulting in public panic, confusion, or harm, shall be punished with imprisonment for a term which may extend to five years and shall also be liable to a fine. Explanation: For the purposes of this section, 'false or misleading information' includes any content that is fabricated, distorted, or presented in a manner that can reasonably lead to misunderstandings or misrepresentations."

Section 302B - Hate Speech and Incitement to Communal Violence

"Whoever, through electronic communication or social media, publishes or transmits hate speech or incites violence against individuals or groups based on attributes such as religion, ethnicity, or nationality, shall be punished with imprisonment for a term which may extend to seven years and shall also be liable to a fine. Explanation: For the purposes of this section, 'hate speech' includes any language or content that disparages or promotes hostility against individuals or groups on the basis of their religious or ethnic identity."

Section 302C - Defamation and Targeted Harassment

"Whoever, with intent to damage the reputation of an individual or group, or to harass them, publishes or transmits false statements or defamatory content via electronic communication or social media, shall be punished with imprisonment for a term which may extend to three years and shall also be liable to a fine. Explanation: For the purposes of this section, 'defamatory content' includes any content that is false and likely to harm the reputation of an individual or group, and 'targeted harassment' includes persistent and deliberate online attacks against individuals based on personal characteristics or beliefs."

Section 302D - Propaganda and Promotion of Extremist Content

Anyone using electronic communication or social media to spread extremist ideologies, promote violence, or recruit for extremist activities shall face imprisonment up to ten years and a fine. 'Extremist content' includes material promoting radical ideologies or inciting unlawful acts based on religious or political motives. These provisions aim to address cybercrimes involving social and religious issues while upholding fundamental rights and ensuring justice.

3.2.6. Penalty Calculation

(i)Amendment to Section 113: Amended Section 113(8) Cyber Terrorism and Attacks on National Security Infrastructure
(1) Whoever, with intent to threaten the unity, integrity, security, or sovereignty of India, commits cyber terrorism by (i)Breaching defense networks, nuclear systems, or government databases,(ii)Launching AI-driven misinformation campaigns to incite public unrest,(iii)Conducting mass-scale cyber fraud targeting financial institutions,
Shall be punished with imprisonment minimum 10 years to life **and** a fine not less than Rs. 10 crore **as per the** following:
$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ *(Using Equation 4 Imprisionment)*
$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ *(Using Equation (6) Fine)*
(2) If such an offense results in the loss of human life due to hacking of medical devices or cyber-attacks on critical healthcare systems, the perpetrator shall be sentenced to death or life imprisonment**.**

(ii) Extension to section 129 Criminal Force BNS: Insertion of Section 129A for social media Crime: Cyber Crimes Targeting Individuals Using AI, Deepfake Technology, or Personal Data Breaches , Cyber bullying, Crypto currency Fraud & Social Media Ponzi Schemes
(1) Any person who, using artificial intelligence or deep fake technology, commits offenses such as (i)Non-consensual deep fake pornography,(ii)AI-driven impersonation for financial fraud,(iii)Data breaches targeting personal medical, financial, or identity information,(iv) Morphing & Image Abuse(v) Fake Video & Image Manipulation for Misinformation(vi) AI Voice Cloning and Digital Arrest Scams
Shall be punished with **imprisonment and fine** calculated as follows:
$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ *(Using Equation 4 Imprisionment)*
$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ *(Using Equation (6) Fine)*
(2).Cybercrimes targeting individuals through the use of Artificial Intelligence (AI), deepfake technology, or personal data breaches carry severe penalties under the law.(1) The minimum punishment for such offenses is imprisonment for a period of five years along with a fine of Rs. 2 lakh. (2)In cases where the victim suffers a financial loss exceeding Rs. 1 crore due to these offenses, the term of imprisonment shall not be less than ten years.(3) Furthermore, if the crime leads to extreme consequences such as the victim's suicide, permanent mental trauma, or irreparable financial loss, the punishment shall extend to life imprisonment. These stringent provisions aim to deter perpetrators and ensure robust protection for individuals against evolving technological threats.
iii)Amendment to Section 78 BNS:

Insertion Of section 78(A) BNS: Cyber Stalking and Harassment through AI and Automated Bots
(1) Whoever, using automated scripts, artificial intelligence bots, or social engineering tactics, harasses, stalks, or intimidates individuals online, leading to (i)Financial fraud or identity theft,(ii)Emotional distress or self-harm,(iii)Organized hate campaigns and public defamation, shall be punished with imprisonment and fine as per the following:
$MI=\alpha\times Risk\ Score+\beta\times FD+\gamma$ *(Using Equation 4 Imprisionment)*
$MF=\delta\times Risk\ Score+\epsilon\times FD+\zeta$ *(Using Equation (6) Fine)*
(2) Cyber stalking and harassment carried out through the use of Artificial Intelligence (AI) and automated bots attract stringent penalties under the law. (i)The punishment for such offenses includes a minimum imprisonment of 5 years, which may extend up to a maximum of ten years depending on the severity of the offense.(ii) Additionally, a fine is imposed on the offender, with the minimum amount being Rs. 1 lakh and the maximum fine extending up to Rs. 5 crore. These provisions aim to safeguard individuals from the growing threats posed by AI-driven harassment and ensure strict legal action against the perpetrators.
(3) If such an offense is committed against minors, women, or vulnerable individuals**,** the punishment shall be doubled**.**
Note: BNS, 2023, like the IPC, 1860, defines crimes and prescribes punishments, while BNSS, 2023, replacing CrPC, 1973, addresses procedural aspects such as compensation and victim support, placing victim compensation appropriately under BNSS. The provisions for victim compensation, rehabilitation, and restitution that were found under Chapter XXVII CrPC Sections 357, 357A, 357 B,3588, and 359 of the CrPC have been moved to the BNSS 2023, which replaces the CrPC, 1973. For any reference to victim compensation, Chapter XXIX The Judgement Sections 395,396,397 of BNSS, 2023 apply[41].

3.3 Proposed Amendments In BSA 2023
The proposed amendments to the BSA, 2023 aim to address its current limitations and enhance its effectiveness in dealing with digital evidence. These reforms will strengthen the admissibility, security, and reliability of electronic evidence, ensuring a future-ready legal framework for cybercrime enforcement.

3.3.1 Concerns with the BSA, 2023
The researcher examines the **BSA's shortcomings** in managing digital evidence as below:
Evidence Tampering :The Bharatiya Sakshya Adhiniyam (BSA), 2023, raises concerns regarding the handling of electronic records, which are highly vulnerable to tampering. Without stringent safeguards, manipulated evidence may lead to wrongful convictions or acquittals, undermining justice.
Admissibility of Digital Evidence: Although the BSA includes provisions for electronic records, it lacks clarity on admissibility criteria. This ambiguity may result in inconsistent rulings, making it difficult for parties to challenge or defend the authenticity of digital evidence, thereby affecting trial fairness.
Coercion and Pressure in Custody: The BSA fails to protect accused individuals from coercion or undue pressure in police custody. This omission increases the risk of unreliable confessions, leading to wrongful convictions and undermining the integrity of the justice system.
Overreliance on Expert Opinions: The requirement for forensic experts to authenticate digital evidence increases the workload on forensic labs, causing delays and prolonging trials. This bottleneck contradicts the principle of ensuring a fair and speedy trial.

3.3.2. Related work for Enhancing BSA Effectiveness

To address these concerns, several steps can be taken to enhance the effectiveness of the BSA.
(i)The Standing Committee Recommendations propose mandating the secure handling of electronic evidence and ensuring a proper chain of custody. This involves implementing strict procedures for collecting, storing, and transferring electronic records to prevent tampering and maintain integrity. Proper chain-of-custody protocols enhance the credibility of electronic evidence, reducing the risk of wrongful convictions.
(ii):Guidelines by the Karnataka High Court: The guidelines suggest introducing safeguards during search and seizure of electronic evidence, including the presence of forensic examiners and the use of Faraday bags to prevent remote data alteration. These measures ensure the integrity, admissibility, and reliability of evidence in court.
(iii)The Law Commission Recommendations focus on addressing the issue of coercion in obtaining evidence and revising custody-related provisions to ensure fairness. The Commission suggests preventing coercion by ensuring that evidence obtained in custody is voluntary and free from undue pressure. Revising custody provisions would protect the rights of alleged hackers or cybercriminals, enhancing overall fairness.
(iv)The Malimath Committee following Recommendations provide further insights into reforming the BSA.It proposes introducing 'social welfare offenses' for minor violations, with penalties like fines or community service, promoting restorative justice and reducing judicial burden.
Implement a 'mixed system' blending adversarial and inquisitorial elements, empowering judges to independently gather evidence, ensuring balanced and informed decisions.
A mixed system combines both approaches, allowing judges to gather evidence actively while retaining adversarial elements, ensuring fairness and thoroughness, especially in complex cases.

3.2.3. Proposed Amendments to the BNS 2023

By implementing these recommendations, the BSA could be made more effective, ensuring the fair and just handling of cases involving electronic evidence and reducing the risk of miscarriages of justice. The researcher explores the proposed recommendations to amendment the BSA 2023/Indian Evidence Act as below:

Admissibility of Electronic Evidence : Amendment of Section 63 BSA

BNS 2023 needs changes to clearly define how electronic evidence can be used in court. This includes rules for expert opinions, proof under Section 65B of the of the Indian Evidence Act, and proper ways to present digital evidence. To fix this, BSA 2023 should consider its Section 61 (Electronic/Digital Records) and Section 62 (Special Rules for Electronic Evidence), with updates to Section 63.

Proposed Section 63(6) BSA. Admissibility of Electronic Evidence[40][41]
(1) In any judicial proceeding, electronic evidence shall be admissible, provided that it is relevant, reliable, and authentic.
(2) The principles governing the admissibility of electronic evidence shall include:
(i) Authenticity: The party seeking to admit electronic evidence must demonstrate that the evidence is genuine and has not been altered.(ii) Reliability: The electronic evidence must be proven to be reliable, considering the manner in which it was generated, stored, and retrieved.
(iii) Relevance: The electronic evidence must be relevant to the matter in dispute and must contribute to the resolution of the issues before the court.(iv)Integrity: The electronic evidence must be shown to have maintained its original form without any unauthorized alterations, ensuring that the data has not been tampered with from the point of collection to its presentation in court.(v)Admissibility: The evidence must meet the legal standards for admissibility under applicable laws, including compliance with statutory requirements such as the Indian Evidence Act or relevant procedural codes.(vi)Chain of Custody: A clear and documented chain of custody must be established, showing the evidence's secure handling from its initial collection to its submission in court. Any break in this chain could raise questions about the evidence's credibility.(vii)Preservation: The evidence must have been preserved in a manner that protects it from loss, damage, or unauthorized access, ensuring its availability and integrity during the trial.(viii)Confidentiality: Any electronic evidence that contains sensitive or private information must be handled in a way that protects confidentiality, in accordance with legal obligations and privacy laws.(ix)Proportionality: The collection and use of electronic evidence must be proportionate to the case at hand, ensuring that the evidence gathered is relevant and necessary, without overreaching into irrelevant or excessive data.(x)Legality of Acquisition: The manner in which the electronic evidence was obtained must comply with legal standards, ensuring that the evidence was not collected through illegal or unethical means, such as unauthorized hacking or surveillance.
(xi)Accuracy: The electronic evidence must be accurate and free from errors that could mislead the court. This includes verifying the precision of data timestamps, metadata, and the accuracy of digital forensics tools used.(xii)Accessibility: The evidence must be in a format that is accessible and understandable to the court, with any necessary conversions or explanations provided to facilitate its evaluation.
These parameters collectively ensure that electronic evidence presented in court is reliable, credible, and legally valid.

(3*) In determining the admissibility of electronic evidence, the court shall consider the medical forensics principles as outlined in researcher publication[20].*
(4)In cases where electronic evidence plays a crucial role, the standard of proof may be lowered from 'beyond reasonable doubt' to 'clear and convincing evidence' as deemed appropriate by the court, ensuring that justice is served while protecting the rights of the accused.

Section 63 (7): Safeguards during search and seizure operations and qualifications of expert witnesses in cybercrime cases.
(1)During search and seizure operations involving electronic devices, a certified forensic examiner must be present to oversee the seizure process and ensure that the integrity of the evidence is maintained.
(2)Electronic devices seized during an investigation must be placed in Faraday bags or equivalent protective measures to prevent remote access or alteration of data.
(3) An individual may be considered an expert witness in cases involving cybercrime, computer forensics, or cyber security if they possess specialized knowledge, skill, experience, training, or education in the relevant field.
(4) The qualifications for an expert witness shall include:(i) Demonstrated expertise in the specific area of digital forensics, cybersecurity, or related disciplines.(ii) Relevant professional experience in conducting digital investigations or providing expert analysis in legal proceedings.(iii) Adequate understanding of the technical and legal aspects of electronic evidence.
(3) An expert witness shall have the responsibility to provide objective and impartial testimony, based on their specialized knowledge, to assist the court in understanding technical matters related to electronic evidence.

Section 63 (8): Certification of Electronic Evidence under Section 65B of the Evidence Act.
(1) The certification of electronic evidence, as required under Section 65B of the Information Technology Act, 2000, shall comply with the following guidelines[42][43]:
(i) The certificate shall state that the electronic evidence was produced by a computer during the period in which it was used regularly for the activities relevant to the production of the evidence.(ii) The certificate shall confirm that the information contained in the electronic evidence is accurate and that the computer was operating properly at the time the evidence was generated.(iii) The certificate shall be signed by a person holding a responsible official position in relation to the operation of the relevant device or the management of the relevant activities.
(2) The certifying authority must possess the necessary qualifications and knowledge to authenticate the electronic evidence.

Section 63 (9): Presumption as to Genuineness of Electronic Records
(1) Unless the contrary is proved, electronic records shall be presumed to be genuine and to accurately represent the information they purport to contain.
(2) This presumption shall apply only if the electronic record has been maintained in accordance with the established chain of custody, ensuring its integrity from the point of creation to its presentation in court.
(3) The provisions of Section 79A of the Information Technology Act, 2000, regarding the presumption of the genuineness of electronic records, shall be applicable, and the principles of chain of custody shall be reinforced accordingly.

Section 63 (10): Guidelines for the Presentation of Digital Evidence in Court
(1) Digital evidence presented in court shall be displayed in a format that is easily comprehensible to all parties, including judges, jurors, and other stakeholders.
(2) The party presenting the digital evidence must ensure that the evidence is accompanied by a clear explanation of its relevance, authenticity, and reliability.
(3) The court may require that digital evidence be presented using appropriate technology, including audio-visual aids or expert testimony, to enhance understanding.

Section 63(11): **Protection of Digital Evidence from Tampering and Contamination using Secure Collection, Storage and Chain of Custody of Electronic Evidence**
(1) Digital evidence must be protected from tampering, alteration, or contamination from the time of its collection to its presentation in court.
(2) The integrity of digital evidence shall be maintained through the use of forensic tools and techniques that preserve its original state.
(3) The court shall ensure that the proposed forensic process model, as outlined in chapter 3, section 3.6.3, is followed to safeguard the authenticity and integrity of digital evidence throughout the investigation and trial process. all electronic evidence collected during investigations shall be handled securely, ensuring that it is stored in a manner that prevents tampering or unauthorized access. procedures for the collection, storage, and transfer of electronic evidence must be stringently followed to maintain its integrity.

(4)A documented chain of custody shall be maintained for all electronic evidence from the point of collection to its presentation in court. any breach in the chain of custody may render the evidence inadmissible unless the court deems otherwise based on specific circumstances.

Section 63(12): Expert Review of Electronic Evidence
(1) Either the defense or the prosecution may request an independent expert review of electronic evidence to verify its accuracy, authenticity, and reliability.
(2) The independent expert's findings shall be presented in court, and the expert may be called upon to testify regarding their analysis.
(3) The court shall consider the expert's review in determining the admissibility and weight of the electronic evidence in question.

Section 63(13): Mixed Adversarial-Inquisitorial System : Judges shall have the authority to independently gather and examine evidence, particularly in cases involving complex electronic evidence, to ensure that all relevant information is considered before reaching a verdict.
These proposed sections provide a comprehensive framework for addressing the complexities of electronic evidence in legal proceedings, ensuring that it is handled with the necessary rigor and integrity.

3.2.4 International Cooperation

Improving collaboration with other nations to combat cybercrime involves establishing mutual legal assistance agreements, extradition treaties, and frameworks for sharing information. These measures are essential for locating and apprehending cybercriminals operating internationally. The proposed section for BSA 2023: International Cooperation in Cybercrime Investigations is as stated below:
Section 83 Presumption as to collection of laws and reports of decisions of the government of any country shall be amended as
Section 83 A: International Cooperation for Cybercrime Investigation and Evidence Sharing
1) Mutual Legal Assistance: Courts may recognize and act upon Mutual Legal Assistance Treaties (MLATs) and agreements with foreign jurisdictions for the collection, preservation, and admissibility of electronic evidence in cybercrime cases.
2) Extradition and Cross-Border Prosecution: The government shall facilitate extradition processes for cybercriminals under existing bilateral and multilateral treaties, ensuring the prosecution of offenders operating beyond national borders.
3) Information Sharing Framework: Law enforcement agencies shall establish mechanisms for real-time sharing of cybercrime-related intelligence, forensic reports, and digital evidence with international partners, subject to national security and privacy laws.
4) Recognition of Foreign Digital Evidence: Electronic evidence obtained from a foreign jurisdiction shall be admissible in Indian courts, provided it complies with authentication, chain of custody, and certification requirements under this Act.
5) Joint Cybercrime Task Forces: The government may collaborate with international agencies to form joint task forces for coordinated cybercrime investigations, focusing on cyber threats such as financial fraud, ransomware, AI-driven attacks, and transnational hacking syndicates.This provision ensures effective international cooperation, enabling India to combat cybercrime through enhanced legal and forensic collaboration with global partners.

4. CONCLUSION

The Information Technology Act, 2000, along with the Bharatiya Nyaya Sanhita (BNS) and Bharatiya Sakshya Adhiniyam (BSA), lacks adequate provisions to address next-generation cyber threats such as AI-driven attacks, deepfakes, cryptojacking, ransomware 2.0, metacrime, and quantum computing-based cybercrimes. These gaps create significant enforcement challenges, leaving advanced cybercriminal activities inadequately regulated. Additionally, the absence of clear definitions and countermeasures for AI-powered threats, cyber warfare, espionage, and state-sponsored attacks exposes national security to sophisticated digital intrusions. Furthermore, the current legal framework fails to account for cyber risk assessment, impact analysis, and risk exposure evaluation, which are critical for determining the severity and potential damage of next-generation cybercrimes. Without incorporating these elements, the legal system remains ill-equipped to quantify the financial, operational, and reputational harm caused by evolving cyber threats. To mitigate these risks, comprehensive amendments are proposed to strengthen these laws and enhance their ability to effectively address and regulate emerging cyber threats.
The researcher proposed a legal frameworks for next-generation cybercrimes addresses emerging threats such as crypto jacking, AI-powered attacks, deep fake manipulation, ransom ware 2.0, quantum computing threats, dark web activities, metacrime, and cyber attacks on IoT. It analyses relevant criminal and cyber laws, the role of intermediaries, and the safe harbor principle for digital platforms. The researcher explores evolving legal principles in response to these threats, incorporating case law and statute jurisprudence with suitable examples

The proposed Comprehensive Insurance, Compensation, and Penalties (CIP) model integrates cyber risk assessment, projection, refinement, mitigation, and management with the to address cyber threats. It assesses various cybercrimes and recommends immediate victim compensation, leveraging cyber insurance to cover financial losses and legal costs. Cyber insurance provides financial protection, but businesses must evaluate their needs to ensure adequate coverage. Cyber compensation safeguards against evolving risks, while punishment ensures cyber integrity through refined algorithms that adapt to emerging threats and jurisdictional challenges.

The researcher developed quantitative models for cyber victim insurance and penalties. Victim's Compensation (VC) is calculated as:
VC = (CCI – IC) + TC
Where: CCI = Cyber Crime Impact,IC = Insurance Coverage and TC = Total Compensation
The Cybercrime Penalty Model calculates punishment as:
$MI=\alpha \times Risk\ Score+\beta \times FD+\gamma$
$MF=\delta \times Risk\ Score+\epsilon \times FD+\zeta$
These models refine punishment formulation , ensuring transparency, accountability, and adaptability to evolving cyber threats.

Statistical Modelling justice ensures balanced cyber victim compensation and offender punishment by assessing financial, emotional losses, and breach severity while managing risks through cyber insurance. Punishment algorithms consider offense severity and recidivism to impose fair penalties. Transparency fosters trust, and combining compensation, insurance, and punishment creates a stronger deterrent by imposing financial liability alongside legal consequences.
The rapid evolution of technology has spurred a surge in cybercrimes, challenging the effectiveness of India's IT Act of 2000/2008.The next-generation cybercrimes fuelled by advancements like AI, block chain, crypto currencies, IoT, and quantum computing. These crimes, including AI-Powered Attacks, IoT Exploits, Crypto jacking, deep fakes, Ransom ware 2.0, Quantum Computing Threats, and Met crime, demand a redefinition under Section 2 of ITA 2000. The proposed amendments to the Information Technology Act, 2000 (ITA) aim to address next-generation cyber threats and ensure better protection, compensation, and accountability. (i) The definition section introduces terms for AI-driven attacks, quantum cybercrimes, and deepfake-related offenses, enabling the recognition and regulation of emerging cyber threats. (ii) Section 43A mandates corporate compliance with the Digital Personal Data Protection Act (DPDPA) to safeguard sensitive data and ensure privacy. (iii) Section 43B introduces mandatory insurance coverage for victims of next-generation cybercrimes, with compensation calculated through a structured Cybercrime Insurance Formula (CCI). (iv) Section 43C establishes a mechanism for compensating cybercrime victims using a Victim Compensation Formula (VC), while (v) Section 43D creates a Victim Compensation Fund to provide timely financial relief.(vi) Section 66A expands corporate liability for cyber negligence, holding corporations and management accountable for inadequate security measures. (vii) Section 66G enhances punishments for aggravated cybercrimes, imposing severe penalties in cases involving critical infrastructure, large-scale financial fraud, or irreversible harm. (viii) Strengthening India's legal framework involves enhanced penalties, as proposed in new sections like 70A to 70G for various next generation offenses that is Section 70 A :AI-Powered Attacks, Section 70B - Offenses Relating to IoT Exploits, Section 70 C - Prohibition of Crypto jacking, Section 70 D - Offenses Related to deep fakes, Section 70 E - Criminalization of Ransom ware, Section 70 F - Prevention of Quantum Computing Threats Section 70G - Metacrime Offenses (ix) Section 72B introduces punishments for AI-based cyberattacks and quantum cybercrimes, ensuring proportional penalties for technologically advanced offenses. (x) Section 87A establishes a framework for international jurisdiction and cross-border cooperation, enabling effective prosecution of transnational cybercriminals. (xi) Section 87B standardizes digital forensic investigation procedures to ensure the integrity of electronic evidence. (xii) Section 87C promotes public-private cyber security partnerships to strengthen collective defenses against evolving threats. Finally, (xiii) Section 88D emphasizes promoting digital literacy and cyber security awareness to equip citizens with the knowledge to prevent and respond to cyber threats effectively.
The proposed amendments to the Bharatiya Nyaya Sanhita (BNS), 2023 address critical gaps related to next-generation cybercrimes, data protection, economic offenses, and human rights. These amendments introduce provisions for AI-driven threats, deepfake technology, cyber warfare, and quantum computing risks, ensuring enhanced legal frameworks for evolving cyber threats. The inclusion of graded sentencing, victim compensation, and restorative justice mechanisms strengthens the deterrence of cyber offenses. Moreover, the amendments establish cross-border cooperation, community service guidelines, and safeguards for vulnerable groups, ensuring justice, rehabilitation, and protection while promoting alignment with international standards.
The amendments to the BNS, 2023 introduce critical provisions to address cybercrimes involving medical devices, elections, and social media. Section 100A penalizes cyberattacks on medical devices causing death with life imprisonment or rigorous detention up to twenty years and fines based on risk and financial damage. Sections 177A to 177D enhance EVM security by punishing hacking, tampering, and unauthorized

access, aligning with international standards. Sections 302A to 302C address fake news, hate speech, and defamation on social media, imposing strict penalties. These amendments strengthen cybersecurity, protect public trust, and ensure electoral and communal harmony.

Section 302D penalizes propaganda and extremist content promotion, while Section 113(8) targets cyber terrorism with severe penalties, including life imprisonment and fines up to Rs. 10 crore. Section 129A punishes AI-based cybercrimes like deepfake impersonation and data breaches, imposing imprisonment and fines based on risk and financial damage. Section 78A addresses AI-driven cyberstalking with penalties doubled for crimes against minors and vulnerable individuals.

Victim compensation, previously under CrPC Sections 357–359, is now covered under BNSS Sections 395–397, ensuring comprehensive victim support. These amendments strengthen cybersecurity, safeguard individuals, and uphold justice in the digital age.

The proposed amendments to the Bharatiya Sakshya Adhiniyam (BSA), 2023 aim to enhance the handling, admissibility, and security of digital evidence. Key reforms include implementing strict chain-of-custody protocols as recommended by the Standing Committee, safeguarding electronic evidence during search and seizure per Karnataka High Court guidelines, preventing coercion during evidence collection following Law Commission suggestions, and introducing a mixed system blending adversarial and inquisitorial elements as proposed by the Malimath Committee. These changes ensure fairness, protect digital evidence integrity, and strengthen the justice system's effectiveness.

The proposed amendments to the Bharatiya Sakshya Adhiniyam (BSA), 2023 aim to enhance the admissibility, authenticity, and security of electronic evidence by incorporating guidelines on chain of custody, expert witness qualifications, and safeguards during search and seizure. Sections 63(6)–63(13) introduce strict protocols for handling, preserving, and presenting digital evidence, ensuring compliance with Section 65B of the Indian Evidence Act. Additionally, Section 83A establishes international cooperation frameworks for mutual legal assistance, extradition, and information sharing, strengthening India's capacity to combat transnational cybercrime.

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