Justification of the Distinct Programmes & Course Structure

Sl.No	School	UG/PG/ Integrated	Name of the Programme	Duration (Yrs)	Intake	To offer in	Category
1	Engineering & Technology	UG	Semiconductor Technology	4	60	2026-27	D+I
2		UG	Quantum Computing	4	60	2026-27	D+I
3		UG	Digital Twin Technology	4	60	2026-27	D+I
4		Integrated	AI in Health Care Technology	5	60	2026-27	D+I+M
5		PG	Computational Neuroscience & AI	2	12	2026-27	D+M
6		PG	Health Robotics and Assisted Nursing	2	12	2026-27	D+T
7	Health Sciences	UG	BSc - Digital Health	4	60	2026-27	D+M
8	Liberal Arts & Indian Culture	UG	B.A. (Hons.) Indian Knowledge Systems and Cultural Heritage	4	60	2026-27	D

D - Distinct, I – Industry-Supported, M – Multidisciplinary, T-Transdisciplinary

B.Tech in Semiconductor Technology

Justification:

National Impact:

India is in need of qualified workforce to support the India Semiconductor Mission (ISM) to enhance the economy, establish technical sovereignty, and lessen reliance on imports, semiconductor courses are essential to India's national significance. These courses are essential for fostering creativity, building a strong ecosystem for chip design and production, and securing the country's place in the world of technology. The sector is projected to create over a million jobs by next few years as a part of Industry 4.0, including roles in design, fabrication, testing, and manufacturing. We need a strong talent pool is needed to embrace this technological shift.

Overall Impact:

The semiconductor industry is a massive global market in itself, with sales reaching hundreds of billions of dollars annually. It supplies the vital chips that enable contemporary goods and services to function, enabling trillions of dollars in downstream industries like electronics, automobile, and finance. For nations with a significant presence in the sector, it is a big employer and a substantial factor in boosting economic strength and competitiveness. India can improve its standing internationally and establish itself as a center for electronics innovation and production by emerging as a key player in the semiconductor sector. This sector fosters innovation that improves many facets of daily life by making gadgets more potent, effective, and small.

Employability:

Initiatives like the India Semiconductor Workforce Development Program (ISWDP) and courses mapped to the National Skills Qualification Framework (NSQF) are critical for developing a workforce that meets industry needs.

• Government Initiatives: The India Semiconductor Mission (ISM, 2021) with an outlay of ₹76,000 crores under the Production Linked Incentive (PLI) scheme is aimed at making India a global hub for semiconductor design and manufacturing.
• National Electronics Policy 2019 targets a $400 billion electronics manufacturing industry by 2025, requiring skilled chip designers, fabrication engineers, and materials scientists.
• Skilled Manpower Demand: India needs over 2,00,000 semiconductor professionals in design, manufacturing, and R&D over the next decade.

Year 1: Foundation (40 Credits)

I SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Mathematics I (Calculus & Differential Equations)	4
2	Engineering Physics (Solid State Physics, Quantum Basics)	4
3	Engineering Chemistry / Environmental Science	3
4	Introduction to Programming (C/Python)	3
5	Basic Electrical & Electronics Engineering	3
6	Communication Skills & Professional English	2
7	Engineering Graphics / Workshop Practice	1
	Total Credits	**20**

II SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Mathematics II (Probability, Statistics, Complex Analysis)	4
2	Materials Science & Engineering	3
3	Analog & Digital Electronics	3
4	Object-Oriented Programming	3
5	Engineering Mechanics	3
6	Design Thinking & Innovation	3
7	Internship	1
	Total Credits	**20**

Year 2: Core Electronics & Devices (40 Credits)

III SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Signals & Systems	4
2	Semiconductor Physics & Devices	4
3	Electronic Circuits	3
4	Microprocessors & Microcontrollers	3

5	Electromagnetic Theory	3
6	Humanities Elective (Ethics/Industrial Psychology)	2
7	Internship	1
	Total Credits	

IV SEMESTER (20 Credits)

S. No	Course Title	Credits
1	VLSI Design Fundamentals	4
2	Integrated Circuit Fabrication Technology	3
3	Analog & Mixed Signal Design	3
4	Control Systems	3
5	Open Elective I (CS/AI/IoT/Mechatronics)	3
6	Laboratory: Device Fabrication & Characterization	3
7	Internship	1
	Total Credits	

Year 3: Semiconductor Specialization (40 Credits)

V SEMESTER (20 Credits)

S. No	Course Title	Credits
1	CMOS Circuit Design	3
2	MEMS & Nanoelectronics	3
3	Wafer Fabrication & Cleanroom Practices	4
4	Semiconductor Packaging & Testing	3
5	Elective I (Photonics, Optoelectronics, Power Semiconductors)	3
6	Minor Project I (Chip Design / Fabrication Simulation)	4
	Total Credits	**20**

VI SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Advanced VLSI & SoC Design	3
2	Semiconductor Process Integration	3
3	EDA Tools & Verification	3
4	Embedded Systems & Applications	3
5	Open Elective II (AI for Chip Design, Quantum Computing, 5G Hardware)	3
6	Minor Project II (Prototype Device or Design Validation)	5
	Total Credits	**20**

Year 4: Industry & Research Integration (40 Credits)

VII SEMESTER

S. No	Course Title	Credits
1	Semiconductor Manufacturing & Supply Chain	3
2	Reliability & Failure Analysis of Semiconductors	3
3	Elective II (Nano-materials, Compound Semiconductors, Flexible Electronics)	3
4	Elective III (Automotive Electronics, Biomedical Devices, IoT Hardware)	3
5	Emerging Technologies in Semiconductors (AI Chips, Neuromorphic,	3

	Quantum Devices)	
6	Industry Internship (2 months)	4
7	Major Project Phase I (Chip/Product Development)	4
	Total Credits	**19**

VIII SEMESTER

S. No	Course Title	Credits
1	Intellectual Property Rights & Tech Entrepreneurship	3
2	Major Project Phase II (Capstone Project with Industry/Research Lab)	10
3	Open Elective III (Interdisciplinary)	2
	Seminar / Viva-Voce / Portfolio Development	2
	Total Credits	**17**

Credit Distribution
Basic Sciences & Mathematics – 24
Engineering Sciences – 12
Core Electronics & Semiconductor Engineering – 45
Specialization & Professional Electives – 27
Open Electives – 8
Projects & Internships – 26
Humanities & Management – 18
Total = 160 Credits

B.Tech in Quantum Computing

Justification:

National Impact:

Quantum computing is important for India as it offers a competitive advantage in critical areas like national security, cryptography, AI, and scientific discovery, and supports the country's goal of becoming a developed nation by 2047. India is investing in the field through the National Quantum Mission (NQM), fostering a domestic ecosystem through various institutions and supporting start-ups. This strategic focus aims to drive economic growth, societal transformation, and position India as a leader in advanced technologies. As a part of NQM providing substantial funding and support to researchers, institutions, and start-ups across the country.

Overall Impact:

The potential of quantum computing to improve AI and large data analysis, change industries like banking and logistics, and alter medical and materials science through drug discovery and molecular simulation makes it significant on a global scale. Many sectors and logistics depend on this technology's ability to solve intricate optimization issues with numerous variables. The race is already being led by nations like the United States, China, and the European Union, while many more are developing their own national quantum agendas. It is believed that dominance in quantum computing is strategically necessary for future national security and economic prosperity.

Employability:

• Government Initiatives:
- The National Quantum Mission (NQM, 2023–2031) has an allocation of ₹6,003 crore to develop quantum computers, secure communications, quantum sensors, and post-quantum cryptography.
- India aims to build intermediate-scale quantum computers (50–1000 qubits) in the next 8 years.
• Skilled Manpower Demand: Requires highly specialized talent in quantum algorithms, quantum physics, and advanced cryptography. Projected demand of ~25,000 quantum technology experts by 2030.

Year 1: Foundation (40 Credits)

I SEMESTER

S. No	Course Title	Credits
1	Mathematics I (Calculus & Linear Algebra)	4
2	Physics I (Mechanics, Waves, Optics)	4
3	Chemistry / Environmental Science	3
4	Programming Fundamentals (Python/C)	3
5	Basic Electrical & Electronics Engineering	3
6	Communication Skills & Professional English	2
7	Engineering Graphics / Workshop Practice	1
	Total Credits	**20**

II SEMESTER

S. No	Course Title	Credits
1	Mathematics II (Probability, Statistics, Complex Variables)	4
2	Physics II (Modern Physics & Introduction to Quantum Mechanics)	4
3	Data Structures & Algorithms	3
4	Digital Logic & Computer Organization	3
5	Introduction to AI & Emerging Technologies	3
6	Humanities Elective (Ethics, Philosophy of Science)	2
7	Internship	1
	Total Credits	**20**

Year 2: Core Computing + Quantum Basics (40 Credits)

III SEMESTER

S. No	Course Title	Credits
1	Linear Algebra & Group Theory for Quantum Computing	4
2	Quantum Mechanics for Engineers	4
3	Operating Systems	3
4	Database Management Systems	3

5	Signals & Systems	3
6	Open Elective I (IoT/Robotics/Applied Math)	3
7	Internship	1
	Total Credits	**21**

IV SEMESTER

S. No	Course Title	Credits
1	Quantum Physics II (Spin, Entanglement, Measurement Theory)	3
2	Computer Networks & Cybersecurity	3
3	Algorithms & Complexity Theory	3
4	Quantum Programming (Qiskit, Cirq, PyQuil)	4
5	Machine Learning Foundations	3
6	Laboratory: Quantum Simulation Tools (IBM Q Experience)	3
7	Internship	1
	Total Credits	**20**

Year 3: Quantum Specialization (40 Credits)

V SEMESTER

S. No	Course Title	Credits
1	Quantum Algorithms (Shor's, Grover's, Variational Algorithms)	4
2	Quantum Error Correction & Fault Tolerance	3
3	Quantum Hardware (Superconducting Qubits, Trapped Ions, Photonics)	3
4	Quantum Information Theory	3
5	Elective I (Quantum Chemistry / Quantum Materials / Quantum Sensing)	3
6	Minor Project I (Quantum Simulation/Software)	4
	Total Credits	**20**

VI SEMESTER

S. No	Course Title	Credits
1	Quantum Cryptography & Quantum Communication	3
2	Cloud Quantum Computing (IBM, Google, Azure Quantum)	3
3	Quantum Machine Learning	4
4	Elective II (Quantum Optics, Topological Qubits, Neuromorphic Computing)	3
5	Open Elective II (AI for Quantum, Data Science, HPC)	3
6	Minor Project II (Prototype QC Application)	4
	Total Credits	**20**

Year 4: Industry & Research Integration (40 Credits)

VII SEMESTER

S. No	Course Title	Credits
1	Quantum Operating Systems & Compilers	3
2	Quantum Devices & Semiconductor Integration	3
3	Emerging Frontiers in Quantum Tech (Quantum Internet, Quantum Cloud, Quantum Metrology)	3
4	Elective III (Quantum Finance, Quantum Biology, Quantum AI)	3
5	Elective IV (Quantum Materials, Quantum Sensors, Space Applications)	3
6	Internship in Quantum Lab / Industry	4
7	Major Project Phase I (Product/System Prototype)	4
	Total Credits	**23**

VIII SEMESTER

S. No	Course Title	Credits
1	Tech Entrepreneurship & IPR in Quantum Technologies	3
2	Major Project Phase II (Capstone with Research Lab / Startup)	10
3	Open Elective III (Multidisciplinary – Policy, Ethics, Futuristic Tech)	2
4	Viva-Voce / Seminar / Portfolio	2
	Total Credits	**17**

Credit Distribution
Basic Sciences & Mathematics – 28
Core Computing (CS + Engineering Sciences) – 36
Core Quantum Engineering – 39
Professional Electives – 15
Open Electives – 9
Projects & Internships – 26
Humanities, Ethics & Policy – 7
Total = 160 Credits

B.Tech in Digital Twin Technology

Justification:

National Impact:

India's primary mission in digital twin technology is the **Sangam: Digital Twin initiative**, led by the Department of Telecommunications (DoT) to revolutionize infrastructure planning and design. The initiative aims to use digital twins, combined with AI, IoT, and 5G/6G, to create a real-time virtual model for testing and planning sustainable infrastructure projects before physical implementation. Digital twin technology is important for transforming operations and decision-making in a variety of sectors like Manufacturing, Healthcare, Aerospace, Automotive, Energy, Retail, Construction and Urban planning. Organizations can use digital twins to optimize resource consumption, which are very important to focus for Sustainable Development.

Overall Impact:

Digital twin technology's worldwide goal is to transform businesses in order to boost productivity, facilitate predictive maintenance, and spur innovation in fields including urban planning, manufacturing, and healthcare. The global market for digital twins is expected to rise significantly, from about $21 billion in 2025 to over $240 billion by 2035. The integration of AI, IoT, and machine learning technologies, as well as the growing need for virtual prototyping and predictive maintenance across sectors including manufacturing, healthcare, and automotive, are the key drivers of this quick growth. According to various assessments, the industry is growing quickly, with a high Compound Annual Growth Rate (CAGR) of 30.54% through 2035 and 47.9% between 2025 and 2030.

Employability:

• Various policies related to Digital Twin like Sangam, National Smart Cities Mission and **Industry 4.0 states the importance of skilled professionals in this technology.**
• Supported by National Smart Cities Mission, which integrates digital twins for urban infrastructure, energy management, and transportation planning.
• Skilled Manpower Demand: Engineering services companies in India (Infosys, TCS, LTTS) already employ thousands in simulation and twin modelling. Demand is projected to cross 50,000 professionals by 2030 across aerospace, automotive, healthcare, and smart infrastructure.

Year 1: Foundation (40 Credits)

I SEMESTER

S. No	Course Title	Credits
1	Mathematics I (Calculus & Linear Algebra)	4
2	Physics for Engineers (Mechanics, Waves, Optics)	4
3	Chemistry / Environmental Science	3
4	Programming Fundamentals (Python/C)	3
5	Engineering Graphics & CAD	3
6	Communication Skills & Professional English	2
7	Workshop Practice / Basic Electronics	1
	Total Credits	**20**

II SEMESTER

S. No	Course Title	Credits
1	Mathematics II (Probability, Statistics, Differential Equations)	4
2	Engineering Mechanics & Materials	3
3	Data Structures & Algorithms	3
4	Electrical & Electronics Engineering Fundamentals	3
5	Introduction to IoT & Emerging Technologies	3
6	Design Thinking & Innovation	3
7	Internship	1
	Total Credits	**20**

Year 2: Core Computing + Systems (40 Credits)

III SEMESTER

S. No	Course Title	Credits
1	Signals & Systems	3
2	Database Management Systems	3
3	Computer Networks & Cybersecurity	4
4	Sensors, Actuators & Embedded Systems	3
5	Thermodynamics & Fluid Systems (for physical twins)	3
6	Humanities Elective (Industrial Psychology, Ethics)	3
7	Internship	1
	Total Credits	**20**

IV SEMESTER

S. No	Course Title	Credits
1	Modeling & Simulation Fundamentals	3
2	Control Systems & Automation	3
3	Cloud Computing & Edge Computing	3
4	Mechatronics & Cyber-Physical Systems	3
5	Open Elective I (AI/Robotics/AR-VR)	3
6	Laboratory: Simulation Tools (MATLAB, ANSYS, Simulink)	4
7	Internship	1
	Total Credits	**20**

Year 3: Digital Twin Specialization (40 Credits)

V SEMESTER

S. No	Course Title	Credits
1	Digital Twin Architecture & Platforms	4
2	3D Modeling & Additive Manufacturing (CAD/CAM/3D Printing)	3
3	Data Analytics & Machine Learning for Digital Twins	3
4	Industrial IoT (IIoT)	3
5	Elective I (Smart Cities / Healthcare Twins / Aerospace Twins)	3
6	Minor Project I (System-level Digital Twin Prototype)	4
	Total Credits	**2**

VI SEMESTER

S. No	Course Title	Credits
1	Cloud-Edge Integration for Digital Twins	3
2	AR/VR & XR Interfaces for Twin Visualization	3
3	Predictive Maintenance & Asset Management	3
4	Elective II (Defence DT, Automotive DT, Energy Systems)	3
5	Open Elective II (Blockchain, Quantum Tech, Sustainability)	3
6	Minor Project II (Industry Case Study with Simulation Lab)	5
	Total Credits	**20**

Year 4: Capstone, Industry & Research (40 Credits)

VII SEMESTER

S. No	Course Title	Credits
1	Advanced Digital Twin Applications (Smart Manufacturing, Defence, Healthcare)	3
2	AI-Driven Digital Twin Ecosystems	3
3	Emerging Trends in Digital Twin (Metaverse, Industry 5.0, Twin Transition for Sustainability)	3
4	Elective III (Robotics Twins, Human Digital Twins, Space Systems)	3
5	Elective IV (Autonomous Systems, IoT Security, Cognitive Twins)	3
6	Internship (2 months, Industry/Research Lab)	4
7	Major Project Phase I (DT Product/System Prototype)	4
	Total Credits	**23**

VIII SEMESTER

S. No	Course Title	Credits
1	Tech Entrepreneurship, IPR & Innovation Management	3
2	Major Project Phase II (Capstone – Industry/Startup Collaboration)	10
3	Open Elective III (Interdisciplinary / Management / Policy)	2
4	Seminar / Viva-Voce / Portfolio	2
	Total Credits	**17**

Credit Distribution
Basic Sciences & Mathematics – 24
Core Computing & Engineering Sciences – 36
Digital Twin Core & Labs – 37
Professional Electives – 15
Open Electives – 9
Projects & Internships – 26
Humanities, Ethics & Management – 13
Total = 160 Credits

M.Tech in AI in Healthcare Technology
M.Tech in Computational Neuroscience and AI
M.Tech in Health Robotics and Assisted Nursing

Justification:

The courses in healthcare domain are unique, inter and multidisciplinary in nature. These courses are in sync with Sustainable Development Goals (SDGs) and various National Healthcare Initiatives launched by the Government of India to promote health initiative and healthy lifestyle. With the increase in demand for healthcare, which includes preventive and curative medical treatments, there is rising demand for products promoting health and well-being along with alterative systems of healthcare.

National Impact:

India's mission in healthcare education is to address the country's shortage of skilled health professionals, especially in rural areas, through an overhaul of medical education, increased digitalization, and a greater emphasis on skill-based and community-focused training. India's

mission in healthcare education involves a multi-pronged approach, including expanding access through the National Health Mission (NHM) and Ayushman Bharat Programme, strengthening the workforce via the Skill India Mission and promoting interdisciplinary courses, and modernizing with digital health initiatives like the National Digital Health Mission. The goal is to improve the quality and accessibility of healthcare for all Indians by focusing on both rural and urban areas, and by integrating technology into the education and delivery of healthcare services. The course supports India's vision to create a resilient and inclusive healthcare system.

Overall Impact:

With its global perspective, the interdisciplinary domain education related to Healthcare incorporates international health policy trends and financial strategies, enabling students to compare, contrast, and apply global best practices within the global context. This international outlook prepares graduates to contribute both domestically and on the global healthcare stage. Using technology to bridge the gap between formal education and the practical needs of the healthcare industry. Providing high-quality medical education to Prepare a workforce that is competent, compassionate, and equipped to handle global health challenges.

Employability:

Skilled Manpower Demand for AI & Healthcare:

o National AI Strategy –AI for All (NITI Aayog, 2018) identifies healthcare, agriculture, smart cities, and education as priority sectors.
o The IndiaAI Mission (2023) with ₹10,371 crore funding promotes AI compute infrastructure, datasets, and workforce skilling.
o India has the second-largest AI workforce globally (~420,000 professionals), yet faces a talent shortfall of 200,000+.
o Annual demand is growing at 20–25%, especially for AI/ML engineers, data scientists, and AI-in-healthcare specialists.

Demand for healthcare in India will outgrow supply by 2035 owing to growing population and consumer class. India's Medical device market is growing at 15 per cent annually and stands currently at $11 - $12 billion, with projections to reach $50 billion by 2030, of which around 70-80 per cent is imported. India is likely to be the second largest driver of growth in the global nutraceutical market to the 2030 (after China), driven by rising incomes and consumer awareness. In order to strengthen healthcare, the Government of India is reforming medical education through structural and regulatory reforms, and overhaul of modern medical education as well as Indian System of Medicine by ensuring Uniform standards of education, create curriculum relevant to Indian context.

Graduates of this can be a part of Health Policy, Planning, and Finance program are well-suited for impactful roles in healthcare management and administration, including Health Policy Analyst, Healthcare Planner, Health Economist, Health Finance Manager, Healthcare Strategist, and Healthcare Consultant. Their specialized training in health policy analysis, strategic planning, and financial management positions them as essential contributors to shaping and optimizing healthcare systems, ensuring efficiency, equity, and sustainability in the delivery of healthcare services with the integration of e-learning, AI, virtual reality (VR), and augmented

reality (AR) offers more flexible, scalable, and immersive training experiences. These graduate can do the innovation and implementation of cutting-edge technologies in the healthcare sector.

Skilled Manpower Demand for Computational Neuroscience and AI:

Opportunities in both business and research in domains like neuro technology, data science, AI development, and digital health, computational neuroscience and AI offer excellent employability. Graduates can pursue careers in user experience design, scientific journalism, computational finance, or as AI specialists, neuroscientists, or neuro-engineers. Computational neuroscience informs the design of more advanced AI algorithms, especially for deep learning, reinforcement learning, and spiking neural networks (SNNs). Both the business sector and academics provide a wide range of prospects, including start-ups, and large tech organizations.

- The cognitive AI market is growing even faster, with a projected compound annual growth rate (CAGR) of 26.74% from 2025 to 2030.
- The global neuroscience market, which includes computational tools, was valued at $38.86 billion in 2025 and is projected to grow at a CAGR of 6.18% to reach $52.45 billion by 2030. Another report forecasts the broader digital health and AI neuroscience market to reach $79.3 billion by 2033.

Skilled Manpower Demand for Health Robotics and Assisted Nursing:

Graduates of this program are well-prepared for diverse roles at the intersection of healthcare and technology, including Medical Device Engineer, Wearable Technology Developer, Regulatory Affairs Specialist for Medical Devices, Healthcare Data Analyst, Clinical Research Manager, and Biomedical Product Manager.

o Make in India and Atmanirbhar Bharat encourage robotics in manufacturing, defense, agriculture, and healthcare.
o SAMARTH Udyog Bharat 4.0 Programme (under Department of Heavy Industries) supports robotics-driven smart factories.
o National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS, 2018) with ₹3,660 crore outlay includes robotics as a priority.
o The Indian robotics market is projected to grow at 18–20% CAGR, reaching $7–8 billion by 2030.
o Estimated 1 million robotics and automation professionals will be required by 2035 in manufacturing, logistics, medical robotics, and AI-driven service robots

M.Tech - AI in Healthcare Technology

Duration: 5 Years (10 Semesters)
Total Credits: 200

Credit Distribution
Basic Sciences (BS): 24–26
Engineering Sciences (ES): 20–22
Healthcare & Life Sciences (HS): 24–26
Professional Core (PC): 60–65
Professional Electives (PE): 18–20

Open Electives (OE): 12–15
Humanities & Management (HSMC): 8–10
Projects / Internships / Thesis: 30–35
Mandatory Courses (MC): Induction, Environmental Studies, Constitution of India, Professional Ethics (Non-credit)

Semester-wise Structure

I SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Mathematics – I (Calculus & Linear Algebra)	4
2	Engineering Physics / Chemistry	3
3	Programming for Problem Solving (Python/C)	3
4	Human Anatomy & Physiology	3
5	Communication Skills / Professional English	2
6	Programming Lab	2
7	Basic Sciences Lab	2
8	Induction / Environmental Studies (MC)	
	Total Credits	**20**

II SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Mathematics – II (Probability & Statistics, Differential Equations)	3
2	Data Structures & Algorithms	3
3	Principles of Electrical & Electronics Engineering	3
4	Biochemistry & Medical Biology	3
5	Healthcare Systems & Medical Terminology	3
6	Data Structures Lab	2
7	Biology / Biochemistry Lab	2
8	Internship	1
	Total Credits	**20**

III SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Object-Oriented Programming (Java/C++)	3
2	Database Management Systems	3
3	Biomedical Instrumentation	3
4	Signals & Systems	3
5	Open Elective – I	3
6	OOP & DBMS Lab	2
7	Biomedical Lab	2
8	Constitution of India / Universal Human Values (MC)	0
9	Internship	
	Total Credits	**19**

IV SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Operating Systems	3
2	Computer Networks & IoT for Healthcare	3

3	Fundamentals of Artificial Intelligence	3
4	Medical Imaging Systems	3
5	Open Elective – II	3
6	AI Lab	2
7	Imaging & IoT Lab	2
8	Mini Project – I	1
	Total Credits	**20**

V SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Machine Learning	3
2	Healthcare Data Analytics	3
3	Cloud Computing for Health Data	3
4	Medical Ethics, Regulations & Standards	3
5	Professional Elective – I	3
6	ML Lab	2
7	Healthcare Data Lab	2
8	Minor Project – II (AI for Clinical Dataset)	1
	Total Credits	**20**

VI SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Deep Learning	3
2	Natural Language Processing in Healthcare	3
3	Digital Health & Telemedicine	3
4	Biosignal Processing (ECG, EEG, EMG)	3
5	Professional Elective – II	3
6	DL Lab	2
7	Biosignal Lab	2
8	Innovation Lab / Prototype Development	1
	Total Credits	**20**

VII SEMESTER (20 Credits)

S. No	Course Title	Credits
1	AI in Medical Imaging (Radiology, Pathology, Ophthalmology)	3
2	Robotics in Surgery & Rehabilitation	3
3	Reinforcement Learning for Healthcare Systems	3
4	Professional Elective – III	3
5	Open Elective – III	3
6	Healthcare AI Lab	2
7	Seminar / Technical Writing	2
8	Mini Project – III (Clinical AI Pilot Project)	1
	Total Credits	**20**

VIII SEMESTER (20 Credits)-B. Tech Exit Point

S. No	Course Title	Credits
1	Advanced Healthcare Systems & Hospital Management	3

2	Cybersecurity & Privacy in Health Data	3
3	Professional Elective – IV	3
4	Comprehensive Viva / Qualifying Exam	2
5	Major Project – I (Capstone: AI-Healthcare Solution)	9
	Total Credits	**20**

IX SEMESTER (20 Credits)-M. Tech Phase

S. No	Course Title	Credits
1	Advanced Topics in AI for Healthcare (Precision Medicine, Genomics AI)	3
2	AI-driven Drug Discovery & Personalized Therapy	3
3	Research Methodology & Paper Writing	2
4	Professional Elective – V	3
5	Open Elective – IV	3
6	Major Project – II (Research/Product Development)	6
	Total Credits	**20**

X SEMESTER (20 Credits)-M. Tech Phase

S. No	Course Title	Credits
1	Dissertation / Thesis (Healthcare AI Application)	16
2	Seminar & Publications	2
3	Clinical / Industry Internship	2
	Total Credits	**20**

Elective Baskets
Professional Electives
AI in Oncology, Cardiology, Neurology
Wearable Devices & Remote Monitoring
AR/VR in Medical Training & Surgery
Predictive Analytics for Public Health
AI for Genomics & Precision Medicine
Digital Twins in Healthcare
Open Electives
Bioethics & Health Policy
Entrepreneurship in Healthcare Tech
Cognitive Science & Human Factors
Business Analytics in Pharma/Healthcare
Global Health & Sustainable Development

M.Tech in Computational Neuroscience and AI

Duration: 2 Years (4 Semesters) | **Total Credits:** 80 |
Program Type: Interdisciplinary (Engineering + Cognitive Science + AI)

I SEMESTER (Foundation (17 Credits)

S. No	Course Code	Course Title	L	T	P	Credits
1	CNS 101	Fundamentals of Neuroscience for Engineers	3	0	0	3
2	CNS 102	Mathematical Foundations for Neural Computation	3	1	0	4
3	CNS 103	Machine Learning & Deep Learning Techniques	3	0	2	4
4	CNS 104	Neural Signal Processing & Brain Data	3	0	2	4

		Analytics				
5	CNS 105	Neuroscience & AI Simulation Lab (Python/MATLAB/NEURON)	0	0	4	2
6	CNS 106	Research Methodology & IPR (Audit/Non-Credit)	2	0	0	2
		Total Credits				**17**

II SEMESTER (Cognitive and Computational Models (18 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	CNS 201	Cognitive Computing & Brain Modeling	3	0	2	4
2	CNS 202	Artificial Neural Systems & Spiking Neural Networks	3	0	2	4
3	CNS E1	Program Elective – I (choose 1)	3	0	0	3
4	CNS E2	Program Elective – II (choose 1)	3	0	0	3
5	CNS 203	Cognitive-AI Project / Innovation Lab	0	0	4	2
6	CNS 204	Technical Seminar / Review Presentation	0	2	0	2
		Total Credits				**18**

Elective Pool – I & II (Indicative):

- Neuro-Dynamics & Biophysical Modeling
- Neuromorphic Computing and Edge AI
- Reinforcement Learning and Decision Neuroscience
- Explainable AI for Biomedical Systems
- Natural Language Processing for Neural Data

III SEMESTER (Applications & Research Integration (17 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	CNS 301	Neuroinformatics & Computational Cognition	3	0	0	3
2	CNS 302	Brain–Computer Interfaces & Neural Prosthetics	3	0	2	4
3	CNS E3	Program Elective – III	3	0	0	3
4	CNS OE1	Open/Interdisciplinary Elective (Industry / HealthTech / Robotics)	3	0	0	3
5	CNS 303	Mini Research Project / Design Studio – I	0	0	8	4
		Total Credits				**17**

Elective Pool – III (Open):

. Bioinformatics and Genomic Data Analytics

- Biomedical Signal & Image Processing
- Robotics and Neural Control Systems
- Human–Computer Interaction & AR/VR

IV SEMESTER (Dissertation & Capstone (13 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	CNS 401	Major Thesis / Dissertation (Phase II)	0	0	24	12

2	CNS 402	Comprehensive Viva / Publication Seminar	0	0	0	1
		Total Credits				**13**

Overall Program Summary Semester Credits
Semester I 17
Semester II 18
Semester III 17
Semester IV 13
Total 80 Credits

M.Tech in Health Robotics and Assisted Nursing

Duration: 2 Years (4 Semesters) | **Total Credits:** 80 |
Eligibility: B.E./B.Tech in Biomedical / Electronics / Mechatronics / AI & Robotics / Instrumentation / Allied Health Sciences (B.Sc. Nursing, BPT, BOT, etc.) with bridge courses as needed.

I SEMESTER (Foundations of Health Robotics (17 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	HRA 101	Human Anatomy, Physiology & Biomechanics for Engineers	3	0	0	3
2	HRA 102	Fundamentals of Robotics and Mechatronic Systems	3	1	0	4
3	HRA 103	Sensors, Actuators & Control Systems in Healthcare Devices	3	0	2	4
4	HRA 104	AI & Machine Learning for Health Robotics	3	0	2	4
5	HRA 105	Health Robotics Simulation & Prototyping Lab (MATLAB / ROS / Arduino / SolidWorks)	0	0	4	2
6	HRA 106*	Research Methodology, Biostatistics & IPR (Audit Course)	2	0	0	0
		Total Credits				**17**

II SEMESTER (Intelligent Systems and Assisted Care (18 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	HRA 201	Rehabilitation Robotics and Human–Robot Interaction	3	0	2	4
2	HRA 202	Embedded Systems & IoT for Healthcare Monitoring	3	0	2	4
3	HRA 203	Clinical Nursing Informatics and Patient Safety Systems	3	0	0	3
4	HRA E1	Elective – I (choose one)	3	0	0	3
5	HRA E2	Elective – II (choose one)	3	0	0	3
6	HRA 204	Technical Seminar & Case Study on Health Robotics	0	2	0	2
		Total Credits				**18**

Elective Pool – I & II (Illustrative):
• Assistive & Companion Robots for Elderly Care
• Biomedical Signal & Image Processing
• AI in Clinical Decision Support Systems
• Ethical and Regulatory Frameworks in Medical Robotics
• Robotic Surgery Systems & Haptics

III SEMESTER (Integration, Research & Application (17 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	HRA 301	Intelligent Prosthetics & Exoskeleton Design	3	0	2	4
2	HRA 302	Tele-Nursing and Remote Assistance Systems	3	0	2	4
3	HRA E3	Elective – III	3	0	0	3
4	HRA OE1	Open / Interdisciplinary Elective (Innovation / Entrepreneurship / Bioethics)	3	0	0	3
5	HRA 303	Mini Project / Design Studio – I (Prototype Development)	0	0	8	4
		Total Credits				**17**

Elective Pool – III (Examples):
• Wearable Health Devices & Smart Fabrics
• Cyber-Physical Systems in Healthcare
• Advanced 3D Printing for Prosthetic Devices
• AI-Driven Rehabilitation Planning

IV SEMESTER (Dissertation & Industry Immersion (13 Credits))

S. No	Course Code	Course Title	L	T	P	Credits
1	HRA 401	Major Thesis / Industry-Linked Research Project	0	0	24	12
2	HRA 402	Comprehensive Viva / Research Publication Seminar	0	0	0	1
		Total Credits				**13**

Total Credits Summary
Semester Credits
Semester I 17
Semester II 18
Semester III 17
Semester IV 13
Total 80 Credits

BSc. in Digital Health

Justification:

The integration of technology in healthcare domain is providing more holistic approach to diagnose, prevent and treat diseases. Digital health uses computing platforms, connectivity, sensors, software, in medical device, as device or as companion therapy. Health innovations are accelerating in the digital health domain and therefore, there is a need for the course to be aligned with a dedication to skill development and human resources in order to meet future demands.

Digital Health Market in India is expected to grow $18.34 Bn by 2030 compared to $3.83Bn in 2022 with an impressive CAGR of 21.6%. This growth in digital demand will spur increased uptake of skilled workforce providing them ample opportunities of employability to work in healthcare industry.

National Impact:

- The B.Sc Digital Health program in Hyderabad/Telangana caters to local healthcare needs, integrating digital technologies to enhance patient care and healthcare management, contributing to the region's evolving medical landscape.
- Aligned with India's digital health initiatives, the program contributes to the nation's expertise in leveraging technology for healthcare delivery, preparing graduates to address national health challenges through innovative digital solutions.

Overall Impact:

- With a global outlook, the program incorporates international best practices in digital health, fostering collaborations with global experts and institutions through the application of digital technologies.

Employability:

Generating a dedicated skill workforce in the digital health domain, the course aligns with the needs of the future healthcare landscape. Graduates are equipped to excel not only in traditional healthcare practices but also in harnessing the transformative potential of digital technologies.

Graduates are well-prepared for diverse roles in healthcare technology, digital health start-ups, and healthcare institutions globally. The program's emphasis on practical skills and industry-relevant knowledge enhances employability in the dynamic and rapidly evolving field of digital health.

Graduates of this course will be employed in roles such as Health Informatics Specialist, Digital Health Project Manager, Telehealth Coordinator, Clinical Data Analyst, Health App Developer, Digital Health Consultant, Medical Device Integration Specialist, Healthcare Data Privacy and Security Analyst, E-health Marketing Specialist, Health Technology Assessment Specialist, Population Health Analyst, User Experience (UX) Designer for Health Apps, Digital Health Educator, and Public Health Technologist.

Duration: 4 Years (8 Semesters)
Total Credits: 180 (including Internship)

Credit Distribution
• **Basic Sciences (BS):** 20–22
• **Medical Sciences (MS):** 20–24
• **Professional Core (PC – Digital Health, Data, AI, ICT):** 70–75
• **Professional Electives (PE):** 10–12
• **Open Electives (OE):** 6–8
• **Humanities, Ethics & Management (HSMC):** 8–10
• **Research Project / Dissertation:** 5–6
• **Internship (Industry/Clinical/Tech):** 20–22
• **Mandatory Courses (MC):** Induction, Environmental Studies, Constitution of India, Professional Ethics (Non-credit)

I SEMESTER (19 Credits)

S. No	Course Title	Credits
1	Human Anatomy & Physiology – I	4
2	Introduction to Healthcare Systems	3
3	Basics of Computer Science & Digital Technologies	3
4	English Communication & Professional Skills	2
5	Mathematics for Data Analytics	3
6	Anatomy & Physiology Lab	2
7	Computer Fundamentals Lab	2
8	Environmental Studies (MC)	0
	Total Credits	**19**

II SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Human Anatomy & Physiology – II	4
2	Biochemistry & Pathology Basics	3
3	Database Management Systems	3
4	Health Information Systems & EHR	3
5	Programming Fundamentals (Python/R)	3
6	DBMS Lab	2
7	Digital Health Systems Lab	2
8	Constitution of India / Universal Human Values (MC)	0
	Total Credits	**20**

III SEMESTER (20 Credits)

S. No	Course Title	Credits
1	Medical Terminology & Clinical Workflows	3
2	Epidemiology & Public Health Informatics	3
3	Data Structures & Algorithms	3
4	Telemedicine & Telehealth Platforms	3
5	Open Elective – I	3
6	Data Structures Lab	2
7	Telemedicine Lab	3
	Total Credits	**20**

IV SEMESTER (22 Credits)

S. No	Course Title	Credits
1	Biostatistics & Research Methodology	3
2	Digital Health Devices, IoT & Wearables	3
3	Artificial Intelligence in Healthcare	3
4	Cybersecurity & Privacy in Health Data	3
5	Open Elective – II	3
6	AI in Healthcare Lab	3
7	IoT & Wearables Lab	4
	Total Credits	**22**

V SEMESTER (22 Credits)

S. No	Course Title	Credits
1	Cloud Computing & Health Data Storage	3

2	Machine Learning Applications in Healthcare	3
3	Blockchain & Digital Records Management	3
4	Health Data Analytics & Visualization	3
5	Professional Elective – I	3
6	ML in Healthcare Lab	3
7	Mini Project – I (Digital Health Prototype)	4
	Total Credits	**22**

VI SEMESTER (22 Credits)

S. No	Course Title	Credits
1	Advanced Digital Health Platforms (Smart Hospitals)	3
2	Mobile Health (mHealth) Applications	3
3	Predictive Analytics & Precision Medicine	3
4	Hospital Information Systems & Digital Transformation	3
5	Professional Elective – II	3
6	Digital Health Application Development Lab	3
7	Research Project / Dissertation	4
	Total Credits	**22**

VII SEMESTER (24 Credits) - Internship Phase - I)

S. No	Course Title	Credits
1	**Industry/Clinical Internship (6 months)** (Rotations: Hospitals, Health IT Companies, EHR Vendors, Telemedicine Firms)	20
2	Seminar & Technical Writing	4
	Total Credits	**24**

VIII SEMESTER (24 Credits) - Internship Phase - II)

S. No	Course Title	Credits
1	**Industry/Research Internship (6 months)** (Rotations: AI Health Startups, Global Digital Health Projects, WHO/NGO Health Informatics Labs)	20
2	Comprehensive Viva & Exit Examination	4
	Total Credits	**24**

Professional Electives (Basket)

• AI & Deep Learning in Diagnostics
• Digital Therapeutics (DTx)
• Health Economics & Policy Analytics
• AR/VR for Healthcare Training
• Robotics in Surgery & Digital Assistance
• Genomics & Bioinformatics for Digital Health

B.A. (Hons.) Indian Knowledge Systems and Cultural Heritage

Justification:

- Clear focus on emerging or frontier areas of knowledge;
- Interdisciplinary and innovative curricula integrating national priorities and global competencies;

- Distinction in academic vision, pedagogy, and societal relevance not generally offered by conventional universities.
- The proposed B.A. (Hons.) Indian Knowledge Systems and Cultural Heritage is a pioneering academic program designed to revive, reinterpret, and recontextualize India's civilizational knowledge systems — encompassing Vedic, philosophical, linguistic, artistic, scientific, and ecological traditions — in a structured, multidisciplinary academic framework.
- The program integrates Sanskrit texts, philosophy, performing arts, yoga, traditional science, and heritage conservation, with modern tools such as digital archiving, cultural analytics, and heritage entrepreneurship.
- It directly supports the National Mission for Indian Knowledge Systems (IKS) launched by the Ministry of Education and aligns with the AICTE's Model Curriculum for IKS, thus serving as an institutional platform for knowledge preservation, translation, and innovation.
- First-of-its-kind 4-year Honours curriculum combining Indian Philosophy, IKS & Modern Science, Heritage Management, and Digital Humanities.
- Integration of NEP 2020's Multidisciplinary and ABC Framework with internship, field documentation, and capstone projects.

National Impact:

This program supports the Government's vision for an 'Aatma Nirbhar, Ethically Empowered, and Knowledge-Driven India'.

Overall Impact:

Curriculum include fieldwork, internships, projects, and capstone research, fostering experiential and employability-linked learning.

The proposed School of Liberal Arts and Indian Culture, through these two flagship programs, clearly satisfies the Distinct Category criteria by offering academically original, socially responsive, and nationally strategic programs that:

- Integrate ancient Indian knowledge with modern policy sciences;
- Promote innovation in governance, cultural sustainability, and social transformation;
- Advance India's global thought leadership in knowledge traditions and public policy.

Hence, the proposed Deemed-to-be University merits recognition under the Distinct Category for its pioneering academic vision and national relevance, establishing a unique educational model where heritage meets innovation, and tradition meets transformation.

Employability:

Heritage Management, Museum Curation, Digital Humanities, IKS Research, Tourism & Cultural Entrepreneurship.

Duration: 4 Years (8 Semesters) | **Total Credits:** 160 |
Framework: NEP-2020 (CBCS, ABC, Multi-Entry–Exit)

Semester I – Foundations (20 Credits)

Code	Course Title	L	T	P	C
IKS 101	Foundations of Indian Knowledge Systems	3	0	0	3
IKS 102	Introduction to Sanskrit Language – Level I	2	1	0	3
IKS 103	Indian History & Civilization – Pre-Vedic to Gupta Era	3	0	0	3
AEC 101	Communication Skills in English	2	0	2	3
VAC 101	Yoga, Wellness & Human Values	1	0	2	2
MDC 101	Environmental Studies / Indian Ecology & Sustainability	3	0	0	3
Total		**14**	**1**	**4**	**20**

Semester II – Heritage & Philosophy (20 Credits)

Code	Course Title	L	T	P	C
IKS 201	Indian Philosophy – Darshanas & Thinkers	3	0	0	3
IKS 202	Sanskrit Language – Level II	2	1	0	3
IKS 203	Cultural Heritage of India: Art, Architecture & Literature	3	0	2	4
SEC 201	Digital Tools for Heritage Documentation	1	0	2	2
VAC 201	Indian Logic & Scientific Thought	2	0	0	2
OEC 201	Comparative Civilizations / Global Heritage Studies	3	0	0	3
Total		**14**	**1**	**4**	**20**

Semester III – Knowledge Traditions (20 Credits)

Code	Course Title	L	T	P	C
IKS 301	Vedic & Upanishadic Knowledge Traditions	3	0	0	3
IKS 302	Indian Society, Ethics & Governance	3	0	0	3
IKS 303	Heritage Conservation & Museum Studies	2	0	2	3
AEC 301	Telugu / Sanskrit for Knowledge Texts	2	1	0	3
VAC 301	Life Skills & Emotional Intelligence	1	0	2	2
OEC 301	Performing Arts, Music & Aesthetics of India	3	0	0	3
Total		**14**	**1**	**4**	**20**

Semester IV – Indian Sciences & Research (20 Credits)

Code	Course Title	L	T	P	C
IKS 401	Indian Sciences: Ayurveda, Astronomy & Mathematics	3	0	0	3
IKS 402	Indian Epics, Puranas & Narratives	3	0	0	3
IKS 403	Research Methodology in IKS	2	1	0	3
SEC 401	Heritage Field Study / Temple Architecture Mapping	0	0	4	2
OEC 401	Indian Polity & Legal Traditions	3	0	0	3
VAC 401	Value Education & Ethics of Governance	2	0	0	2
Total		**13**	**1**	**4**	**20**

Semester V – Integration & Practice (20 Credits)

Code	Course Title	L	T	P	C
IKS 501	Indian Knowledge & Modern Science Dialogue	3	0	0	3
IKS 502	Indigenous Technologies & Craft Traditions	2	0	2	3
IKS 503	Cultural Heritage Management	3	0	0	3
MNE 501	Multidisciplinary Elective I	3	0	0	3
EXP 501	Internship / Fieldwork in Museum / Cultural Centre	0	0	6	3
VAC 501	Employability & Career Skills	2	0	0	2
Total		**13**	**0**	**8**	**20**

Semester VI – Application & Outreach (20 Credits)

Code	Course Title	L	T	P	C
IKS 601	Indian Aesthetics & Performing Traditions	3	0	0	3
IKS 602	Contemporary Relevance of IKS	3	0	0	3
IKS 603	Heritage Laws & Intellectual Property	3	0	0	3
MNE 601	Multidisciplinary Elective II	3	0	0	3
PRJ 601	Community Heritage Project / Documentation	0	0	6	3
VAC 601	Personality Development & Leadership	2	0	0	2
Total		**14**	**0**	**6**	**20**

Semester VII – Advanced Studies (20 Credits)

Code	Course Title	L	T	P	C
IKS 701	Indian Knowledge Systems in Global Context	3	0	0	3
IKS 702	Advanced Sanskrit Texts & Commentaries	3	1	0	4
IKS 703	Research Seminar / Thesis Proposal	0	2	2	3
DSE 701	Discipline Elective (Yoga Science / Comparative Philosophy / Indian Logic)	3	0	0	3
EXP 701	Heritage Tourism / Outreach Internship	0	0	6	3
Total		**9**	**3**	**8**	**20**

Semester VIII – Capstone & Professional (20 Credits)

Code	Course Title	L	T	P	C
IKS 801	Dissertation / Major Project on IKS & Cultural Heritage	0	0	12	6
IKS 802	Entrepreneurship in Culture & Heritage Industries	2	0	2	3
OEC 801	Indian Knowledge for Sustainable Development	3	0	0	3
VAC 801	Professional Ethics & Global Citizenship	2	0	0	2
IKS 803	Comprehensive Viva / Portfolio Presentation	0	0	6	3

Total		**7**	**0**	**20**	**20**

Program Summary

Category	Total Credits	Percentage of Total (160 Cr)
Core Courses (IKS & Major Subjects)	88	**55 %**
Ability Enhancement Courses (AEC – Communication, Language, Life Skills)	16	**10 %**
Multidisciplinary / Discipline Electives (MNE / OEC / DSE)	24	**15 %**
Skill / Value Added Courses (VAC / SEC)	20	**12.5 %**
Interdisciplinary / Experiential (Internship, Project, Dissertation)	12	**7.5 %**
Total	**160**	**100 %**

Multiple Entry-Exit Options (as per NEP 2020)

- **Exit after 1 Year (40 Cr):** Certificate in Indian Knowledge and Culture
- **Exit after 2 Years (80 Cr):** Diploma in Indian Culture and Heritage
- **Exit after 3 Years (120 Cr):** B.A. in Indian Knowledge Systems and Heritage
- **4 Years (160 Cr): B.A. (Hons.) / B.A. (Hons. with Research)**

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