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VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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-: પરિપત્ર :-

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા હેઠળની સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રીને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪-૨૫ થી અમલમાં આવનાર (૧) B.C.A. (Cyber Security and Data Protection) (Honours), (૨) B.C.A. (Semiconductor, Sensors and IoT) (Honours) અને (૩) B.C.A. (Artificial Intelligence and Data Analytics) (Honours) અભ્યાસક્રમનાં પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ ફ્રેમવર્ક (Framework) કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી તથા કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૧/૩/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંક:૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય ઈ.ચા.કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./પરિપત્ર/૧૧૩૪૦/૨૦૨૪
તા.૨૯/૦૫/૨૦૨૪

Wjuse
ઈ.ચા.કુલસચિવ ઇવન

પ્રતિ,

૧. યુનિવર્સિટી સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
- ૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
- ૪) એકેડેમિક વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
- ૫) જોડાણ વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ સારૂ.

Veer Narmad South Gujarat University, Surat



Computer Science and I.T. Faculty

Framework

for

Specialization Programs

B.C.A. (Hons.)(Cyber Security and Data Protection)

B.C.A.(Hons.)(Semiconductor, Sensors and IoT)

B.C.A.(Hons.)(Artificial Intelligence and Data Analytics)

As per NEP-2020

To be implemented from

Academic Year: June, 2024-2025

(Including Winter Session)



B.C.A. (Honours) and B.C.A.(Honours) with specialization :

(I) Objective :

Looking at the current need of software industry and emerging need in specialization The student can pursue either pure applied program B.C.A. (Honours) or "B.C.A. (Honours)" program with specializations in "B.C.A. (Cyber Security and Data Protection)", "B.C.A. (A.I. and Data Analytics)" and "B.C.A. (Semiconductor, Sensors, and IoT)".

(i) Comprehensive Skill Development: The program aims to provide students with comprehensive knowledge and practical skills in computer science and information technology, enabling them to excel in diverse career paths within the IT industry.

(ii) Specialization Opportunities: By offering specializations in Cyber Security and Data Protection, A.I. and Data Analytics, and Semiconductor, Sensors, and IoT, the program caters to the growing demand for specialized skills in these emerging fields of technology.

(iii) Addressing Industry Needs: The specialization courses are designed to address specific industry needs and trends, ensuring that students are equipped with the latest technologies, tools, and techniques relevant to their chosen field of specialization.

(iv) Future-Ready Skillset: The program aims to equip students with future-ready skills and competencies, enabling them to adapt to technological advancements and industry disruptions in the rapidly evolving IT landscape.

(v) Industry Collaboration and Internship Opportunities: Collaboration with industry partners and internship opportunities provide students with real-world exposure, practical experience, and networking opportunities, enhancing their employability and readiness for the IT industry.

(vi) Research and Innovation: Encouraging research and innovation initiatives within the program fosters creativity, critical thinking, and problem-solving skills among students, driving technological advancements and contributing to the growth of the IT industry.

(vii) Global Perspective: By offering a global perspective through industry-relevant curriculum, international collaborations, and exposure to best practices and trends, the program prepares students to compete and succeed in the global IT market, opening up opportunities for international careers and collaborations.

(II) Specialization Programs :

(i) B.C.A. (Honours) Program with specialization in Cyber Security and Data Protection:

Objectives:

- Equip students with the knowledge and skills to identify, assess, and mitigate cybersecurity threats and vulnerabilities.
- Provide hands-on experience in implementing security measures, securing data assets, and responding to security incidents.
- Prepare students for roles such as cybersecurity analysts, security consultants, and information security managers, addressing the growing demand for cybersecurity professionals in various industries.

Suggested Courses to cover:

1. Introduction to Cybersecurity and Information Security
2. Programming in C
3. Programming skills using C and Python
4. Digital Logic and Computer Organization
5. Data Structures and Algorithms
6. Operating Systems
7. Database Management Systems
8. Network Fundamentals
9. Web Technologies and Security
10. Ethical Hacking and Penetration Testing
11. Cryptography and Network Security
Minor Project
12. Digital Forensics
13. Software Development and Secure Coding
14. Advanced Cyber Security Practices
Major Project
15. Cloud Security
16. Machine Learning for Cyber Security
17. Compliance and Risk Management
18. Minor Project
19. Incident Response and Management
20. Cyber Law and Ethics
21. Emerging Threats and Security Solutions
22. Major Project

(ii) B.C.A. (Honours) Program with specialization in A.I. and Data Analytics

Objectives:

- Develop expertise in artificial intelligence, machine learning, and data analytics techniques for deriving insights from large datasets.
- Provide practical experience in designing and implementing A.I. algorithms, predictive models, and data-driven decision-making systems.
- Prepare students for careers as data scientists, A.I. engineers, business analysts, and data-driven strategists, leveraging the increasing adoption of A.I. and analytics in industries such as finance, healthcare, and e-commerce.

Suggested Courses to cover:

1. Introduction to Artificial Intelligence
2. Mathematics for Computing
3. Programming in Python / R
4. Introduction to IoT and IoT devices
5. Data Structures and Algorithms
6. Relational Database Management Systems
7. Statistical Methods for Data Analysis
8. Introduction to Data Analytics
9. Machine Learning
10. Data Mining and Warehousing
11. Big Data Technologies
12. Natural Language Processing
13. Data Visualization
14. Cloud Computing for Data Analytics
Minor and Major Projects
15. Deep Learning
16. Predictive Analytics
17. AI Ethics and Governance
18. Minor Project
19. Advanced Topics in AI
20. Real-time Data Analytics
21. AI in Industry Applications
22. Major Project

(iii) B.C.A. (Honours) Program with specialization in Semiconductor, Sensors, and IoT

Objectives:

- Familiarize students with semiconductor technologies, sensor devices, and Internet of Things (IoT) platforms.
- Provide hands-on experience in designing, prototyping, and deploying IoT solutions for various applications, such as smart cities, healthcare, and industrial automation.
- Prepare students for roles in IoT product development, embedded systems engineering, and IoT solution architecture, addressing the growing demand for IoT professionals in the era of digital transformation and connectivity.

Suggested Courses to Cover :

1. Introduction to Computer Science
2. Mathematics for Computing
3. Programming in C/Python/C++
4. Basics of Electronics
5. Data Structures and Algorithms
6. Digital Electronics
7. Microprocessors and Microcontrollers
8. Sensors and Actuators
9. Embedded Systems
10. Internet of Things (IoT) Fundamentals
11. Signal Processing
12. Wireless Communication
13. IoT Protocols and Standards
14. Semiconductor Devices and Technology
15. Advanced IoT Applications
16. Smart Sensors and MEMS (Micro-Electro-Mechanical Systems)

17. Cloud Computing for IoT
18. Minor Project
19. IoT Security and Privacy
20. Industrial IoT
21. Emerging Technologies in Semiconductors and IoT
22. Major Project

(III) Eligibility for offering specialization Programs:

As the B.C.A. program falls under the umbrella of AICTE, the institutes which caters the AICTE compliance and affiliated with the University can offer any or all of these specialization programs. The students who enrolled for the B.C.A. program can select any of the specialization program if they desire so; provided the institute offers the same depending on the viability in terms of number of students for the specialization program.

To obtain specialization degree, the student can opt specific major course specified in the curriculum as mentioned in Table-1, Table-2 and Table-3, which is mandatory to accomplish successfully and obtain its credits. The specialized courses are designed for each specializing program. Institutes can offer these major courses to the students. It is necessary to acquire credits from the same group of courses to avail degree in specialization as mentioned in the Table-1, Table-2 and Table-3.

- **Institute having approved divisions from the AICTE for B.C.A. can offer specialization program to their students where students are required to opt the major courses relevant to the specialization programs for each semester and acquire required credits from the major courses to avail the final degree in B.C.A. with specialization as mentioned in Table-1, Table-2 and Table-3.**
- **Selection of specialization program will be optional for the students. It will be a choice of the student enrolled for the B.C.A. to select any of the given specialization program from first semester. Students who do not select any specialization program will get B.C.A. degree. It will be upto the institute to offer the specialization program in B.C.A.**

(IV) Student's Eligibility:

All students who possess the eligibility to enroll for B.C.A. are eligible to pursue the B.C.A. in specialization program. Student can select group of major courses from the Table-1, Table-2, Table-3 and acquire required credits to become eligible for degree with specialization.

(V) Number of Courses and Credits essential for Specialization Program:

- > **For F.Y.:** Total 2 courses (in specialization subject) consists of 8 credits (4 each for both semester). (As mention in Table-1, Table-2, Table-3)
- > **For S.Y.:** Total 4 courses (in specialization subject) consists of 16 credits (8 each for both semester). (As mention in Table-1, Table-2, Table-3)
- > **For T.Y.:** Total 6 courses (in specialization subject) consists of 24 credits (12 each for both semester). (As mention in Table-1, Table-2, Table-3)
- > **For Fourth Year :** Total 32 credits (in specialization subject) (16 each for both semester).

To obtain the B.C.A. with specialization degree, total 48 credits need to obtain in major subjects relevant to specialization program.

To obtain the B.C.A.(Hons.) with specialization degree, total 48 credits need to obtain in major subjects relevant to specialization program.

(VI) Multi-level Entry and Exit option as per NEP-2020:

- vii) **Under Graduate Certificate in specialization program:** If the student wish to exit after completion of First year (Semester-1 and Semeter-2) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester.
- viii) **Diploma in Specialization program:** If the student wish to exit after completion of Second year (Semester-1 to Semeter-4) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.
- ix) **B.C.A. (Bachelor’s in Computer Application) (in Specialization Program) :** If the student wish to exit after completion of Third year (Semeste-1 to semester-6) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.

NOMENCLATURE of DEGREE on MULTI-LEVEL EXIT :

	Exit after Completion of F.Y.	Exit After Completion of S.Y.	Exit After Completion of T.Y.	Exit After Completion of Fourth Year (Hons.)
1	Certificate in Cyber Security and Data Protection	Diploma in Cyber Security and Data Protection	B.C.A. (Cyber Security and Data Protection)	B.C.A.(Hons.) (Cyber Security and Data Protection)
2	Certificate in Artificial Intelligence and Data Analytics	Diploma in Artificial Intelligence and Data Analytics	B.C.A. (Artificial Intelligence and Data Protection)	B.C.A.(Hons.) (Artificial Intelligence and Data Protection)
3	Certificate in Semiconductor, Sensors and IoT	Diploma in Semiconductor, Sensors and IoT	B.C.A. (Semiconductor, Sensors and IoT)	B.C.A.(Hons.) (Semiconductor, Sensors and IoT)

(VII) Internship:

It is mandatory to undergo an Internship for all students and acquire four credits before entering to 2nd year from 1st year and 3rd year from 2nd year. A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

(VI) Fees for the specialization program:

As per the need of specialized program is different from the pure B.C.A. program in terms of subject experts, specially equipped lab and equipment, the fees will be different for different specialized programs.

Sr.No.	Name of Program	Semester Tuition Fees	Semester Lab. Utilization Fees	University Exam Fees	Other Fees and one time fees (Including all heads)	University Affiliation fees
1	B.C.A. (Hons.) (Cyber Security and Data Protection)	19000/-	As per the fees prescribed for B.C.A. Program	Rs.1200/-	As per the current university Fees for B.C.A.	As per current prescribed fees for B.C.A. Program
2	B.C.A.(Hons.) (A.I. and Data Analytics)	19000/-	As per the fees prescribed for B.C.A. Program	Rs.1200/-	As per the current university Fees	As per current prescribed fees for B.C.A. Program
3	B.C.A. (Hons.) (Semiconductor, Sensors and IoT)	21500/-	As per the fees prescribed for B.C.A. Program	Rs.1200/-	As per the current University Fees	As per current prescribed fees for B.C.A. Program

Table-1

(Students are required to opt following courses to avail degree in Cyber Security and Data Protection)

Year	Semester	Specialization Program	Course Code	Type of Course	Course Level	Credits
F.Y.	I	Cyber Security and Data Protection	105-01	Major	200-299	4
	II		205-01	Major	200-299	4
S.Y.	III		304-04	Major	300-399	4
	IV		305-04	Major	300-399	4
			404-04	Major	300-309	4
T.Y.	V		405-04	Major	300-399	4
			503-04	Major	400-499	4
	VI		504-04	Major	400-499	4
			505-04	Major	400-499	4
			602-04	Major	400-499	4
Fourth Year (For Honours Degree)		603-04	Major Project	400-499	8	
		Need to Acquire 18 credits from Semester-7 and Semester-8 from specialization courses.		500-599	18	
<p>➤ Students without any backlog must acquire 8 credits from Major courses relevant to Cyber Security and Data Protection in First Year and 4 credits from Internship to avail exit option and certificate.</p>						
<p>➤ Students without any backlog must acquire 8 credits from Major courses relevant to Cyber Security and Data Protection in First Year, 16 credits from Major courses relevant to Cyber Security and Data Protection in Second Year and 4 credits from Internship to avail exit option after second year and Diploma.</p>						
<p>➤ Students without any backlog must acquire 8 credits from Major courses relevant to Cyber Security and Data Protection in First Year, 16 credits from Major courses relevant to Cyber Security and Data Protection in Second Year, 24 credits from Major courses relevant to Cyber Security and Data Protection in Third Year and 4 credits from</p>						

Internship to avail exit option after Third year and B.C.A.(Cyber Security and Data Protection) Degree.
➤ Students without any backlog must acquire 8 credits from Major courses relevant to Cyber Security and Data Protection in First Year, 16 credits from Major courses relevant to Cyber Security and Data Protection in Second Year, 24 credits from Major courses relevant to Cyber Security and Data Protection in Third Year, 32 credits from Major courses relevant to Cyber Security and Data Protection in Fourth Year and 4 credits from Internship to avail B.C.A.(Honours)(Cyber Security and Data Protection) degree.
➤ During the first year of implementation, one visiting faculty having expertise in the subject can be invited for the four credits of load of specialization major subject, if required.

Table - 2

Year	Semester	Specialization Program	Course Code	Type of Course	Course Level	Credits
F.Y.	I	Artificial Intelligence and Data Analytics	103-02	Minor	100-199	4
	I		105-02	Major	200-299	4
	II		204-02	Major	200-299	4
	II		205-02	Major	200-299	4
S.Y.	III		304-05	Major	300-399	4
	III		305-05	Major	300-399	4
	IV		404-05	Major	300-309	4
	IV		405-05	Major	300-399	4
T.Y.	V		503-05	Major	400-499	4
			504-05	Major	400-499	4
			505-05	Major	400-499	4
	VI		602-05	Major	400-499	4
		603-05	Major Project	400-499	8	
Fourth Year (For Honours Degree)			Need to Acquire 18 credits from Semester-7 and Semester-8 from specialization courses.		500-599	18
➤ Students must clear first year without any backlog, acquire 8 credits from Major courses relevant to A.I. and Data Analytics in First Year and 4 credits from Internship to avail exit option and certificate.						
➤ Students must clear second year without any backlog, acquire 8 credits from Major courses relevant to A.I. and Data Analytics in First Year, 16 credits from Major courses relevant to A.I. and Data Analytics in Second Year and 4 credits from Internship to avail exit option after second year and Diploma.						
➤ Students must clear third year without any backlog, acquire 8 credits from Major courses relevant to A.I. and Data Analytics in First Year, 16 credits from Major courses relevant to A.I. and Data Analytics in Second Year, 24 credits from Major courses relevant to A.I. and Data Analytics in Third Year and 4 credits from Internship to avail exit option after Third year and B.C.A.(A.I. and Data Analytics) Degree.						
➤ Students must clear fourth year without any backlog, acquire 8 credits from Major courses relevant to A.I. and Data Analytics in First Year, 16 credits from Major courses relevant to A.I. and Data Analytics in Second Year, 24 credits from Major courses relevant to A.I. and Data Analytics in Third Year, 32 credits from Major courses relevant to A.I. and Data Analytics in Fourth Year and 4 credits from Internship to avail B.C.A.(Honours)(Cyber Security and Data Protection) degree.						
➤ During the first year of implementation, one visiting faculty having expertise in the subject can be invited for the four credits of load of specialization major subject, if required.						

Table - 3

Year	Semester	Specialization Program	Course Code	Type of Course	Course Level	Credits
F.Y.	I	Semiconductor, Sensors and IoT	105-03	Major	200-299	4
	II		205-03	Major	200-299	4
S.Y.	III		304-06	Major	300-399	4
			305-06	Major	300-399	4
	IV		404-06	Major	300-309	4
			405-06	Major	300-399	4
T.Y.	V		503-06	Major	400-499	4
			504-06	Major	400-499	4
			505-06	Major	400-499	4
	VI		602-06	Major	400-499	4
		603-06	Major Project	400-499	8	
Fourth Year (For Honours Degree)			Need to Acquire 18 credits from Semester-7 and Semester-8 from specialization courses.		500-599	18
<p>➤ Students must clear first year without any backlog, acquire 8 credits from Major courses relevant to Semiconductor, Sensors and IoT in First Year and 4 credits from Internship to avail exit option and certificate.</p>						
<p>➤ Students must clear first year without any backlog, acquire 8 credits from Major courses relevant to Semiconductor, Sensors and IoT in First Year, 16 credits from Major courses relevant to Semiconductor, Sensors and IoT in Second Year and 4 credits from Internship to avail exit option after second year and Diploma.</p>						
<p>➤ Students must clear first year without any backlog, acquire 8 credits from Major courses relevant to Semiconductor, Sensors and IoT in First Year, 16 credits from Major courses relevant to Semiconductor, Sensors and IoT in Second Year, 24 credits from Major courses relevant to Semiconductor, Sensors and IoT in Third Year and 4 credits from Internship to avail exit option after Third year and B.C.A.(Semiconductor, Sensors and IoT) Degree.</p>						
<p>➤ Students must clear first year without any backlog, acquire 8 credits from Major courses relevant to Semiconductor, Sensors and IoT in First Year, 16 credits from Major courses relevant to Semiconductor, Sensors and IoT in Second Year, 24 credits from Major courses relevant to Semiconductor, Sensors and IoT in Third Year, 32 credits from Major courses relevant to Semiconductor, Sensors and IoT in Fourth Year and 4 credits from Internship to avail B.C.A.(Honours) (Semiconductor, Sensors and IoT) degree.</p>						
<p>➤ During the first year of implementation, one visiting faculty having expertise in the subject can be invited for the four credits of load of specialization major subject, if required.</p>						