HIMACHAL PRADESH TECHNICAL UNIVERSITY HAMIRPUR



Syllabus

for

Bachelor of Science and Master of Science (BS Honor Major in Computer Science and Minor in Management)

As per National Education Policy (NEP-2020)

(w.e.f. the Academic Year 2023-2024)

Department of Engineering and Technology School of Computer Science and Engineering



Approved by the Board of Studies

1. Preamble

BS and MS is named as Bachelor of Science & Master of Science. The syllabus for this program is framed under National Education Policy (NEP) with core, elective (discipline specific and value added) and other interdisciplinary courses incorporated as its components following the University Grants Commission (UGC) guidelines. The Department has tried to revise the curriculum in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasizing on integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses. The NEP also enables the students to select subjects as per their interest. Also, diverse lab experiments as well as field visits/demonstrations allow students to understand the fundamental aspects of the subject. The curriculum of BS & MS.is designed to meet the growing demand of qualified professionals in the field of ICT & Management. Furthermore, continuous assessment is an integral part of the NEP, which will facilitate systematic and thorough learning towards better understanding of the subject.

2. Program Objectives (POs)

The Bachelor of Science Course in Computer Science provides students with a broad foundation and in-depth understanding of computer science with necessary problem solving and innovation skills needed to succeed in engineering. The core courses include a comprehensive study of data structures, programming languages, algorithms, and computer networks. In addition to these courses, students are also provided courses in applied mathematics, physics, humanities, and management for the overall skill enhancement. The elective courses are also introduced in open elective clusters: Artificial Intelligence and Machine Learning, Information Security, Networks, VLSI, Visual information processing, Theoretical and analytical Computer Science. A student can opt for electives depending upon the interest from either of the clusters to fulfill the semester credits. The program is designed to develop student's skills with extensive knowledge and hands-on experience to analyze, design and implement cutting-edge computer technologies. For developing advanced and specialized skills, courses in Big Data, Cloud Computing, Internet of Things, Cyber Security, Machine Learning and Artificial Intelligence are introduced that also enable students to explore the wider applications and latest trends of computer science. This is accomplished through the following learning goals and objectives:

- **Knowledge of mathematics and computing fundamentals.** Apply the knowledge of mathematics and computing fundamentals to various real-life applications for any given requirement.
- **Design and develop applications**. Design and develop applications to analyze and solve all computer science related problems.
- Effective Communication. Students will use various forms of business communication, supported by effective use of appropriate technology, logical reasoning, and articulation of ideas. Graduates are expected to develop effective oral and written communication, especially in business applications, with the use of appropriate technology (business presentations, digital communication, social network platforms and so on).
- Leadership and Teamwork. Students will acquire skills to demonstrate leadership roles at various levels of the organization and leading teams. Graduates are expected to collaborate and lead teams across organizational boundaries and demonstrate leadership qualities, maximize the usage of diverse skills of team members in the related context.
- Global Exposure and Cross-Cultural Understanding. Graduates will be able to demonstrate a global outlook with the ability to identify aspects of global business and Cross -Cultural Understanding.
- **Integrate and apply efficient tools.** Integrate and apply efficiently the contemporary IT tools to all computer applications.
- **Designing innovative methodologies**. Create and design innovative methodologies to solve complex problems for the betterment of society.

- Applying inherent skills. Apply the inherent skills with absolute focus to function as a successful entrepreneur.
- Social Responsiveness and Ethics. Students will demonstrate responsiveness to contextual social issues/ problems and exploring solutions, understanding ethics, and resolving ethical dilemmas. Demonstrate awareness of ethical issues and can distinguish ethical and unethical behaviors.

3. Program Learning Outcomes (PLOs)

The main outcomes of the BS & MS program are given here. At the end of the program a student is expected to have:

- An understanding of the theoretical foundations and the limits of computing.
- An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
- An ability to design, develop and evaluate new computer-based systems for novel applications which meet the desired needs of industry and society.
- Understanding and ability to use advanced computing techniques and tools.
- An ability to undertake original research at the cutting edge of computer science & its related areas.
- An ability to function effectively individually or as a part of a team to accomplish a stated goal.
- An understanding of professional and ethical responsibility.
- An ability to learn independently and engage in life-long learning.
- An ability to communicate effectively with a wide range of audience.

4. Curriculum Structure

BS & MS degree program will have a curriculum with Syllabi consisting of following type of courses:

- **Core Course:** A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
- **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of the study is referred to as Discipline Specific Elective.
- Value addition, Skill Enhancement & Inter Departmental Elective Course: Generally, a course whichcan be chosen from a pool of courses, and which may be very specific or specialized or advanced or supportive to the discipline/interdepartmental subject of study or which provides an extended scope, or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's values/proficiency/skill is called an Elective Course. These courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills and to improve the employability skills of students.

5. Scheme of Examination



The pass percentage in each subject will be 40%.

• Theory Examination

Irrespective of credits, each paper will be of 100 marks (60 marks for theory exam and 40 marks for internal assessment) and duration of paper will be 3 hours.

• Practical Examination

Each paper will be of 100 marks (60 marks for external practical exam and 40 marks for internal assessment) and duration of paper will be 3 hours.

• Project Report/Dissertation

The Project Report/Dissertation will be evaluated by the internal panel and external examiner from the panel approved by the university authority/evaluation branch, HPTU, Hamirpur. The Head of the Department will

assign a guide/supervisor to each candidate for his/her project/Dissertation work. The candidate shall be required to maintain his/her project diary (logbook) of work in the organization or under the Guide. Each student will be required to give presentations on his/her project work/Dissertation work. Each student is required to submit three copies of his/her project reports to the Department after completion of the project work, which will be evaluated by an external examiner. Most of the students are expected to work on a real-life project/Research, preferably in some industry/Research and Development Laboratories/Educational Institution/Software Company. The student can formulate a project problem/Research problem with the help of her/his Guide and submit the synopsis/Research proposal of the same in the college within 10 days at the starting of Major Project. Approval of the Synopsis /Research proposal is mandatory which will be evaluated by an internal examiner appointed by respective college Principal or Director or university. If approved, the student can commence working on it and complete it by using the latest versions of the software packages/Research Tools for the development of the project/Dissertation.

• Instruction for paper setter

In each theory paper, nine questions are to be set. Two questions are to be set from each Unit and the candidate is required to attempt at least one question from each unit. Question number nine will be compulsory, which will be of short answer type questions with 6 to 8 parts, covering entire syllabus. In all, five questions are to be attempted. The question paper for the end semester examination may have any one of the following patterns: **Section A** (UNIT I) Two questions of long answer type of which one is to be attempted for 12 Marks. **Section B** (UNIT II) Two questions of long answer type of which one is to be attempted for 12 Marks. **Section C** (UNIT III) Two questions of long answer type of which one is to be attempted for 12 Marks. **Section D** (UNIT IV) Two questions of long answer type of which one is to be attempted for 12 Marks. **Section E** (Compulsory) 6 to 8 short answer type questions for 2 to 1.5 marks each and total for 12Marks. **Total marks (A + B + C + D + E) 12+ 12+ 12 + 12 = 60 marks**

End Semester Examination (ESE)

For the theory course, the question paper for the final examination will consist of five sections-A, B, C, D & E. Sections A, B, C, D will have two questions each from the corresponding units I, II, III & IV of the syllabus. Section E will be compulsory and will have short answer type questions covering the whole syllabus. Each question will be of 15 or 8,4 or 6,6 marks. The candidates will attempt five questions in all, i.e.one question each from sections A, B, C, D, and the compulsory question from section E. The question paper is expected to contain problems with a minimum weightage of 25% of the total marks from each unit.

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Doll No.	Total Pagas
	Month-Vear (June-2023)
	$\mathbf{D} \in \mathbf{C} \times \mathbf{M} \in \mathbf{E}$
	B.S. & M.S. Examination
	Title
	Semester_X (NFP)
Time: 3 Hours	Max. Marks: 60
The candidates shall limit their	answers precisely within the answer book (40 pages) issued to them
and no supplementary/continu	ation sheet will be issued.
Note: Attempt five question	s in all by selecting one question from each section A, B, C and
D. Section-E is compulsory.	
	SECTION – A
	(1x12 or 8,4 or 6,6)
1.	
2.	
	SECTION – B
	(1x12 or 8,4 or 6,6)
3.	
4.	
	SECTION $-C$
	(1x12 or 8,4 or 6,6)
5.	
6.	
	SECTION – D
	(1x12 or 8,4 or 6,6)
7.	
8.	
	SECTION – E (Compulsory)
	(6×2=12)
9.	
	(a-f)

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Periodical Examination (PE)

During one semester, there will be two periodical examinations for theory and practical subjects. The question paper will consist of three sections A, B and C having a total of 20 marks. Section A will be compulsory and will have short answer type questions consisting of five parts, each with one mark covering the syllabus mentioned. Sections B and C will contain descriptive type questions of five and ten marks respectively. Sections B and C will have two questions and the candidates will attempt three questions in all, i.e., one question each from sections B and C. Section-A is compulsory.



6. Purposed Subject Code System

Each subject code is denoted by alpha-numerals, alphabets before hyphen indicates course name and four numerals after hyphen indicates level, semester, and subject number respectively.

- For Example: BS-5209
- First two alphabets "BS" is degree indicator.
- First number "5" defines the Level.
- The second number "2" defines the semester.
- Third and fourth numbers are for subject numbers.



7. Assessment & Evaluation

• IA-Internal Assessment (Theory)

Periodical Examination (PE) -I and Periodical Examination (PE) -II = Weightage of **20** Marks (Average of PE-I and PE-II)

Teacher's Assessment (Assignment discussion/ presentation /overall behaviour) = 15 MarksAttendance = 05 Marks

Sr. No.	Percentage of Lecture Attended	Marks Awarded
1	From 75% to 80%	01
2	Above 80% to 85%	02
3	Above 85% to 90%	03
4	Above 90% to 95%	04
5	Above 95%	05

Total (IA) = 10 + 10 + 15 + 5 = 40 for all courses

• IA-Internal Assessment (Practical)

Periodical Examination (PE) (Written/Presentation & Viva-Voce) = 20 Teacher's Assessment (Lab performance /Work Performance + Report/File Work) = 15 Attendance = 05

• EA-External Assessment (Theory) ESE-End-Semester Examination = 60 for all courses. *Total marks for theory evaluation* = (20 + 15 + 05 + 60 = 100) for all courses.

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• External Assessment (Practical)

ESE-End-Semester Examination (written script, performance, External viva-voce etc.) = 60*Total marks for practical evaluation* = 20+20+60 = 100

Template for- IA-Internal Assessment (Theory) HIMACHAL PRADESH TECHNICAL UNIVERSITY Bachelor of Science/Master of Science, School of Computer Science & Engineering AWARD SHEET THEORY (INTERNAL ASSESSMENT)

	Name of the Institut	tion:		Distrib	ution of Ma	ırks		
Subject:	Programme:	Sub. Code:	_ Perio Exami	odical nations	s It Lt	/ n /ior	e	
Branch: MAX. MA	ARKS:	Semester: MIN. MARKS:	1 st Periodical Examination	2 nd Periodical Examination	Teacher' Assessmen Assignmer	discussion presentatio Overall behav	Attendanc	Total Marks
Sr. No.	University Roll No.	Name of Student	10	10	15	05	40	
Name of Inte	rnal Examiner	Head of Dept			Hea	ad of the	Instit	ution
Signature		Signature		Signature			•••••	
Date		Date				Date		

Template for-IA-Internal Assessment (Practical/Project/Seminar/Viva-Voce) HIMACHAL PRADESH TECHNICAL UNIVERSITY Bachelor of Science/Master of Science, School of Computer Science & Engineering AWARD SHEET PRACTICAL (INTERNAL ASSESSMENT) (Practical/Project/Seminar/Viva-Voce)

	Name of the Institut	tion:		Distrib	ution of	Marks		
	Programme:		Period	lical				
Subject:		Sub. Code:	Examin	ation		k k		
Branch	:	Semester:	lation	e,	ner' s ient Lal	nce /wo mance ile wor	dance	Total Morks
			ritten/Preser	Viva-voc	Teach Assessm	performar perforn Report/F	Attend	IVIAI KS
MAX. M	ARKS:	MIN. MARKS:	M					
Sr. No.	University Roll No.	Name of Student	10	10	0 15			40
Name of Intern	al Examiner	Head of Dept			Head o	of the Inst	itutio	n
Signature		Signature			Sig	nature		
Date		Date			Da	te		

*Note: The distribution of marks for Institutional training, Internship, Survey, SWAYAM, MOOCs, NPTEL courses (if any) would be same as above.

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Template for-External Examination (Practical/Project/Seminar/Viva-Voce) HIMACHAL PRADESH TECHNICAL UNIVERSITY Bachelor of science/Master of Science, School of Computer Science & Engineering (Practical/Project/Seminar/Viva-Voce)

Name of the Ins	titute:			
Programme:				
Subject Name:.		Subjec	et Code:	
Branch:		Sen	nester	
Max Marks		Min.	Marks:	
Sr. No.	University Roll No.	Name of Student	Marks in Figure	Marks in Words
Name of Intern Signature	nal Examiner:		External Exa Signature Date	aminer

*Note: The distribution of marks would be on the basis of Work done/Task performance (20 marks), Performance (written/presentation) (20 marks) and viva-voce (20 marks), total=60 marks.

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	Scheme of Teaching and Examination Bachelor of Science and Master of Science(BSMS) BS Honor Major in Computer and Minor in Management											
	Semester-I											
Subject Code	Course Type	Subject Title/ Subject Name		Period	S	Credits]	Evaluat	ion Schei	me	Total
	- , , , , , , , , , , , , , , , , , , ,		L	Т	Р		ESE	Ir	nternal	Assessme	ent	
								PE	TA	А	Total	
BS-4101	CC	Fundamentals of IT	3	1	0	4	60	20	15	5	40	100
BS-4102	CC	Computer Programming in C	3	1	0	4	60	20	15	5	40	100
BS-4103	GE	Fundamentals of Management	4	0	0	4	60	20	15	5	40	100
BS-4104	AEC	Communication English	2	0	0	2	60	20	15	5	40	100
BS-4105	CC	Digital Marketing	2	0	0	2	60	20	15	5	40	100
BS-4106	VAC	Philosophy & Human Values	2	0	0	2	60	20	15	5	40	100
BSID -4100	ID	Interdepartmental Elective	3	0	0	3	60	20	15	5	40	100
Labs:												
BS-4107P	CC LAB	Lab I: Computer Programming	0	0	4	2	60	20	15	5	40	100
BS-4108P	S-4108P ID LAB Lab II: Engineering Physics 0 0 4 2 60 20 15 5 40 100									100		
Total			19	2	8	25	540	180	135	45	360	900

	CC- Core Course	GE – Generic Elective				
	AEC- Ability Enhancement Compulsory	SEC -Skill Enhancement Course				
	VAC – Value Addition Course	T-Tutorial				
Leand	L-Lecture	PE- Periodical examination				
Legend:	P-Practical	TA-Teacher's Assessment				
	ESE-End Semester Examination	DSE – Discipline Specific Elective				
	ID Inter Departmental Elective Course	C- Compulsory				
	A-Attendance					

Inter - Departmental Electives University Wide Course

	Basket of Inter- Departmental Elective courses										
Sr. No.	Subject Code	Title of Subject/Subject Name	Credit								
1	BSID-4100 (i)	Search Engine Optimization	3								
2	BS ID-4100 (ii)	E – Commerce and Content Management System	3								
3	BS ID-4100 (iii)	Computer and Information Security	3								
4	BS ID-4100 (iv)	PC Assembly and Hardware	3								

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				Se	mes	ter-II								
Subject	Subject Course Subject Title/ Subject			Period	s	Credits]	Evaluat	ion Schei	ne	Total		
Code	Туре	Name	L	T	Р		ESE Internal Assessmen		Internal Assessment		ESE Internal Assessment		ent	
								PE	TA	A	Total			
BS-4201	GE	Vedic Mathematics-I	3	1	0	4	60	20	15	5	40	100		
BS-4202	CC	Object Oriented Programming with C++	3	1	0	4	60	20	15	5	40	100		
BS-4203	CC	Digital Electronics	3	0	0	3	60	20	15	5	40	100		
BS-4204	GE	Fundamentals of Human Resource Management	4	0	0	4	60	20	15	5	40	100		
BS-4205	AEC	Environment Science	2	0	0	2	60	20	15	5	40	100		
BS-4206	SEC	ICT Workshop – I	2	0	0	2	60	20	15	5	40	100		
BS-4207	VAC	Digital Empowerment	2	0	0	2	60	20	15	5	40	100		
Labs:														
BS-4208P	CC LAB	Lab III: Object Oriented Programming with C++	0	0	4	2	60	20	15	5	40	100		
BS-4209P	CC LAB	Lab IV: Digital Electronics	0	0	4	2	60	20	15	5	40	100		
Total			19	2	8	25	540	180	135	45	360	900		

Undergraduate Certificate will be awarded after completing first two semesters with minimum of 50 Credits provided all subjects passed and successful completion of 10 Credit bridge course of two-month duration.

	Bridge Course										
Subject Code	Subject Code Course Type Subject Title/ Subject Name										
BS-4210	C	Training / Internship Report and Viva-Voce	6	100							
BS-4211	С	MOOC /NPTEL/ Swayam Certification/ Online Certification	4	100							
	Total										

Note: The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 4 the candidate will have a core knowledge of Computer basics.

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		Scheme of Bachelor of Sc BS Honor Major i	Feac ience	hing and M	g an Iaster	d Exar • of Scienc Minor in	ninat e(BSMS Manage	ion S) ement				
Semester-III												
Subject Course		Subject Title/ Subject Name		Period	s	Credits		ŀ	Evaluati	on Scher	ne	Total
Couc	- ijpe	i vanie	L	Т	Р		ESE		Interna	l Assessi	nent	lotar
								PE	ТА	Α	Total	
BS-5301	GE	Vedic Mathematics-II	3	1	0	4	60	20	15	5	40	100
BS-5302	CC	Data Structure	3	0	0	3	60	20	15	5	40	100
BS-5303	CC	Database Management Systems	3	0	0	3	60	20	15	5	40	100
BS-5304	GE	Principles of Marketing	4	0	0	4	60	20	15	5	40	100
BS-5305	AEC	Communication Skills (Speaking Skills)	2	0	0	2	60	20	15	5	40	100
BS-5306	SEC	ICT Workshop – II	2	0	0	2	60	20	15	5	40	100
IKS-5300	VAC	Indian Knowledge System	2	0	0	2	60	20	15	5	40	100
Labs:												
BS-5307	CC LAB	Lab V: Data Structure	0	0	4	2	60	20	15	5	40	100
BS-5308	CC LAB	Lab VI: DBMS	0	0	4	2	60	20	15	5	40	100
Total			19	1	8	24	540	180	135	45	3600	900

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		Scheme of To Bachelor of Scier	each ice an	ing d Mas	and ster of	l Exam f Science(inatio BSMS))n				
Semester-IV												
Subject Course Subject Title/ S		Subject Title/ Subject		Period	ls	Credits		ŀ	Evaluat	ion Sche	ne	
Code	Туре	Name	L	Т	Р	ESE Internal Assessme		Tota				
								PE	ТА	А	Total	
BS-5401	CC	Theory of Computation	3	1	0	4	60	20	15	5	40	100
BS-5402	CC	Operating Systems	3	0	0	3	60	20	15	5	40	100
BS-5403	CC	Artificial Intelligence	3	0	0	3	60	20	15	5	40	100
BS-5404	GE	Financial Planning & Management	4	0	0	4	60	20	15	5	40	100
BS-5405	AEC	Life Skills and Mentoring	2	0	0	2	60	20	15	5	40	100
BS-5406	CC	Web Technology	3	1	0	4	60	20	15	5	40	100
BS-5407	VAC	Ethics and Culture	2	0	0	2	60	20	15	5	40	100
Labs:												
BS-5408P	CCLAB	Lab VII: OS lab	0	0	4	2	50	20	15	5	40	100
BS-5409P	CCLAB	Lab VIII: AI Lab	0	0	4	2	50	20	15	5	40	100
Total			20	2	8	26	540	180	135	45	360	900

Undergraduate Diploma will be awarded after completing four semesters with minimum of 100 Credits provided all subjects passed and successful completion of 10 Credit bridge course of two-month duration .

Bridge Course								
Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks				
BS-5410	С	Training / Internship Report and Viva-Voce	6	100				
BS-5411	С	MOOC /NPTEL/ Swayam Certification/ Online Certification	4	100				
	Total 10 200							

Note: The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 5 the candidate will have a core knowledge of Computer Programming with its specialization.

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Scheme of Teaching and Examination Bachelor of Science and Master of Science(BSMS) BS Honor Major in Computer and Minor in Management												
Semester-V												
Subject	Course	Subject Title/Subject		Period	ls	Credits		E	valuati	on Schen	ne	T ()
Code	Гуре	Name	L	Т	P		ESE	In	ternal A	Assessme	nt	Iotai
								PE	TA	Α	Total	
BSCS-550	1 CC	Computer Networks	3	0	0	3	60	20	15	5	40	100
BSCS-550	2 CC	Embedded System Design	3	0	0	3	60	20	15	5	40	100
BSCS-550	3 CC	Java Programming	3	1	0	4	60	20	15	5	40	100
BSCS-550	4 CC	Data Mining and Data Warehouse	3	0	0	4	60	20	15	5	40	100
BSCS-550	5 CC	Compiler Design	4	0	0	4	60	20	15	5	40	100
BSCS-550	6 SEC	Personality Development	3	0	0	3	60	20	15	5	40	100
Labs:	Labs:											
BSCS-550	7P CCLAB	Lab IX: Embedded System Design	0	0	4	2	60	20	15	5	40	100
BSCS-550	8P CCLAB	Lab X: Java Programming	0	0	4	2	60	20	15	5	40	100
Total			19	1	8	25	480	160	120	40	320	800

	Scheme of Teaching and Examination Bachelor of Science and Master of Science(BSMS) BS Honor Major in Computer and Minor in Management											
	Semester-VI											
Subject Code	Course Type	Subject Title/ Subject Name		Period	ls	Credits		E	valuati	on Schen	ne	Total
	1,00		L	T	Р		ESE	Iı	nternal	Assessm	1 otur	
								PE	TA	A	Total	
BSCS -5601	CC	Design & Analysis of Algorithms	3	1	0	4	60	20	15	5	40	100
BSCS -5602	CC	Computer Graphics	3	0	0	4	60	20	15	5	40	100
BSCS -5603	CC	Modelling & Simulation	3	0	0	4	60	20	15	5	40	100
BSCS -5604	DSE	DSE - I	4	0	0	4	60	20	15	5	40	100
BSCS -5605	DSE	DSE - II	4	0	0	4	60	20	15	5	40	100
BSCS -5606	SEC	Entrepreneurship Development	3	0	0	3	60	20	15	5	40	100
Labs:	s:											
BSCS -5607P	CCLAB	Lab XI: Computer Graphics	0	0	4	2	60	20	15	5	40	100
BSCS -5608P	CCLAB	Lab XII: Modelling & Simulation	0	0	4	2	60	20	15	5	40	100
Total			20	1	8	27	480	160	120	40	320	800

Bachelor's Degree (BS) will be awarded after completing six semesters with minimum of 152 Credits provided and successful completion of10 Credit bridge course of two-month duration.

	Bridge Course								
Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks					
BSCS-5609	C	Training / Internship Report and Viva-Voce	6	100					
BSCS-5610	C	MOOC /NPTEL/ Swayam Certification/ Online Certification	4	100					
Total			10	200					

Note: The bridge course Training / Internship will be based on MOOC /NPTEL/ Swayam Certification. After completion of Level 5 the candidate will have core knowledge of Computer applications with its specialization.

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	Scheme of Teaching and Examination Bachelor of Science and Master of Science(BSMS) BS Honor Major in Computer and Minor in Management											
Semester-VII												
Subject	Course	Subject Title/ Subject		Period	ls	Credits		E	valuati	on Schen	ne	
Code	Туре	Name	L	T	P		ESE	In	ternal A	Assessme	nt	Total
								PE	TA	A	Total	
BSCS -6101	CC	Cloud Computing	3	1	0	4	60	20	15	5	40	100
BSCS -6102	CC	Machine Learning	3	0	0	4	60	20	15	5	40	100
BSCS -6103	CC	Data Mining	3	0	0	4	60	20	15	5	40	100
BSCS -6104	DSE	DSE - III	3	1	0	4	60	20	15	5	40	100
BSCS -6105	DSE	DSE - IV	4	0	0	2	60	20	15	5	40	100
BSCS -6106	SEC	Business Analytics	3	1	0	4	60	20	15	5	40	100
Labs												
BSCS -6107P	CC LAB	Lab XIII: Cloud Computing Lab	0	0	4	2	60	20	15	5	40	100
BSCS -6108P	CC LAB	Lab XIV: Machine Learning Lab	0	0	4	2	60	20	15	5	40	100
Total	•	•	19	3	8	26	480	160	120	40	320	800

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		Scheme of Tea Bachelor of Scienc BS Honor Major in Co	chin ce and	g an Mast ter an	d Ex ter of d Mi	kaminat Science(I nor in Ma	tion BSMS) Inageme	nt				
				Sem	este	r-VIII						
SubjectCourseSubject Title/ SubjectPeriodsCreditsEvaluation SchemeCodeTypeName									Total			
	- , p •		L	Т	Р		ESE	Iı	nternal	Assessm	ent	
								PE	TA	Α	Total	
BSCS -6201	CC	Graph Theory/Compiler Design	3	1	0	4	60	20	15	5	40	100
BSCS -6202	CC	Big Data Analytics	3	0	0	4	60	20	15	5	40	100
BSCS -6203	CC	Natural Language Processing	3	0	0	4	60	20	15	5	40	100
BSCS -6204	SEC	Business Research Methodology	3	1	0	4	60	20	15	5	40	100
BSCS -6205	DSE	DSE - V	4	0	0	2	60	20	15	5	40	100
BSCS -6206	DSE	DSE - VI	3	1	0	4	60	20	15	5	40	100
Labs												
BSCS -6207P	CCLAB	Lab XV: Big data & Data Analytics Lab	0	0	4	2	60	20	15	5	40	100
BSCS -6208P	CCLAB	Lab XVI: Natural Language Processing Lab	0	0	4	2	60	20	15	5	40	100
Total			19	3	8	26	480	160	120	40	320	800

Bridge Course								
Subject Code	Course Type	Subject Title/ Subject Name	Credits	Total Marks				
BSCS -6209	С	Training / Internship Report and Viva-Voce	6	100				
BSCS -6210	С	MOOC /NPTEL/ Swayam Certification/ Online Certification	4	100				
Fotal 10 200								

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	Scheme of Teaching and Examination Bachelor of Science and Master of Science(BSMS) BS Honor Major in Computer and Minor in Management										
	Semester-IX										
Subject	Subject Course Subject Title/Subject Periods Credits Evaluation Scheme Code Trunc Name Total										
Code	Type Name L T P ESE Internal Assessment								Totai		
			PE TA Total								
BSCS -7301	CC	Colloquium based on Summer Internship Design	8	0	0	8	60	25	15	40	100
BSCS -7302	CC	Fundamentals of IoT	4	0	0	4	60	25	15	40	100
BSCS -7303	DSE	DSE-VII	4	0	0	4	60	25	15	40	100
BSCS -7304	CC	Major Project Part-I / Research	0	0	12	6	120	50	30	80	200
Total			16	0	12	22	300	125	75	200	500

		Scheme of Teac Bachelor of Science BS Honor Major in Con Science	chii and npute	ng al Maste er and ster-	nd] r of S Min X	Examir Science(BS or in Man	ation SMS) agemen	1 nt			
Subject Code	Course Type	Subject Title/ Subject Name	Periods C		Credits	Ev	aluation	luation Scheme			
							ESE	PE	TA	Total	
BSCS -7401	3SCS -7401 CC Major Project Part-II / Research 20 300 100 200										
Total	Fotal								500		

Electives as per the following different groups /streams to be finalized. 1. Computing and Data Sciences 2. Networks and Distributed Processing

- 3. Security
- 4. AI and Robotics
- 5. Visual Information Processing

6. VLSI and Nanotechnology7. Computer Architecture and System Design

	Computing and Data Sciences								
Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name						
1.	DSE	BSCS -5604(A)	Program Analysis Verification and Testing						
2.	DSE	BSCS -5604(B)	Randomized Algorithms						
3.	DSE	BSCS -5604(C)	Semantics of Programming Languages						
5.	DSE	BSCS -5604(D)	Scientific Computing and Numerical Methods						
6	DSE	BSCS -5604(E)	Advanced Competitive Programming						
7.	DSE	BSCS -5604(F)	Big Data and Cloud Computing						
8.	DSE	BSCS -5604(G)	Data Analytics						

Discipline Specific Electives- I

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Discipline Specific Electives- II Networks and Distributed Processing

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -5605(A)	Queuing Theory and Data Networks
2.	DSE	BSCS -5605((B)	High Speed Networks/Internet Traffic - Measurement, Modelling and Analysis
3.	DSE	BSCS -5605(C)	Cellular and Mobile Communication
4.	DSE	BSCS -5605(D)	Wireless Sensor Networks
5.	DSE	BSCS -5605(E)	Special Topics in Complex Networks
6	DSE	BSCS -5605(F)	Parallel and Distributed Computing
7	DSE	BSCS -5605(G)	Grid and Peer-to-Peer Computing
8.	DSE	BSCS -5605(H)	Special Topics in Internet Technologies

Discipline Specific Electives- III Security

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -6104(A)	Computer Security Audit and Assurance
2.	DSE	BSCS -6104(B)	Cryptography and Network Security
3.	DSE	BSCS -6104(C)	Computer Systems Security
4.	DSE	BSCS -6104(D)	Web Architecture Security
5.	DSE	BSCS -6104(E)	Cyber Security and Laws
6	DSE	BSCS -6104(F)	Malware Analysis
7	DSE	BSCS -6104(G)	IoT and its Security
8.	DSE	BSCS -6104(H)	Formal methods for Security Verifications

Discipline Specific Electives- IV AI & Robotics

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -6105(A)	Introduction to Robotics
2.	DSE	BSCS -6105(B)	Embedded Robotics
3.	DSE	BSCS -6105(C)	Mobile Robotics
4.	DSE	BSCS -6105(D)	Introduction to Cognitive Science
5.	DSE	BSCS -6105(E)	Decision Making and Expert system
6	DSE	BSCS -6105(F)	Nature Inspired computing
7	DSE	BSCS -6105(G)	Intelligent Systems and Interfaces
8.	DSE	BSCS -6105(H)	Multi Agents and Application



Discipline Specific Electives- V Visual Information Processing

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -6205(A)	Information Retrieval and Extraction
1.	DSE	BSCS -6205(B)	Image Processing
2.	DSE	BSCS -6205(C)	Digital Watermarking & Steganalysis
3.	DSE	BSCS -6205(D)	Pattern Recognition
4.	DSE	BSCS -6205(E)	Multimedia Systems
5.	DSE	BSCS -6205(F)	Human Computer Interaction
6	DSE	BSCS -6205(G)	Computer Vision
7	DSE	BSCS -6205(H)	Digital Signal Processing

Discipline Specific Electives- VI VLSI & Nanotechnology

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -6206(A)	Introduction to Nanoscience and Technology
2.	DSE	BSCS -6206(B)	VLSI Design
3.	DSE	BSCS -6206(C)	VLSI Testing and Fault Tolerance
4.	DSE	BSCS -6206(D)	CAD for VLSI
5.	DSE	BSCS -6206(E)	Nano electronics
6.	DSE	BSCS -6206(F)	Synthesis of Digital Systems
7.	DSE	BSCS -6206(G)	Integrated Circuit Technology
8	DSE	BSCS -6206(H)	Memory Design

Discipline Specific Electives- VII Computer Architecture and System Design

Sr. No.	Course Type	Subject Code	Subject Title/ Subject Name
1.	DSE	BSCS -7303(A)	Advanced Computer Architecture
2.	DSE	BSCS -7303(B)	Cyber Physical System Design
3.	DSE	BSCS -7303(C)	System-on-Chip Design
4.	DSE	BSCS -7303(D)	On-Chip Interconnection Networks
5.	DSE	BSCS -7303(E)	Trustworthy Systems Design
6.	DSE	BSCS -7303(F)	Neuro-computing Architectures
7.	DSE	BSCS -7303(G)	Advanced Compiler Design
8	DSE	BSCS -7303(H)	Advanced Computer Architecture

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