Swami Rama Himalayan University
Office of the Registrar

SRHU/Reg/OO/2023-144   Date: 22nd July, 2023

OFFICE ORDER

I am directed to inform that the Academic Council in its 29th Meeting under Agenda Item Nos. 29/13 to 29/16 has approved the recommendations made by the **Board of Studies** for the following programmes under Himalayan School of Science & Technology, as enclosed herewith, for implementation:

1. B.Tech. (Computer Science & Engineering) programme, effective from admission batch 2023.
2. B.Tech. (Hons.) Computer Science & Engineering programme with specialization in Artificial Intelligence & Machine Learning, effective for admission batch 2022.
3. B.Tech. (Hons.) Computer Science & Engineering programme with specialization in Data Science & Machine Learning, effective for admission batch 2022.
4. B.Tech. (Hons.) Computer Science & Engineering programme with specialization in Artificial Intelligence & Machine Learning, effective from admission batch 2023.
5. B.Tech. (Hons.) Computer Science & Engineering programme with specialization in Data Science & Machine Learning, effective from admission batch 2023.
6. B.Tech. (Hons.) Computer Science & Engineering programme with specialization in Cyber Security, effective from admission batch 2023.
7. Bachelor of Comwuter Applications (BCA) programme, effective from admission batch 2023.

By Order,

Registrar

Copy to: Hon'ble Chancellor
           Hon'ble Vice Chancellor   } for kind information please
           Director General (Academic Development)
           Controller of Examinations
           Principal, Himalayan School of Science & Technology

Encls.: As above.

BOARD OF STUDIES

BACHELOR OF TECHNOLOGY (B.TECH.)
COMPUTER SCIENCE AND ENGINEERING (CSE)

May, 2023
(Effective from Academic Year 2023-24)

Department of Computer Science and Engineering
Himalayan School of Science & Technology
SWAMI RAMA HIMALAYAN UNIVERSITY
Swami Ram Nagar, Jolly Grant, Doiwala
Dehradun-248016

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Swami Rama Himalayan University
Office of the Registrar

Date: 5th May, 2023

OFFICE ORDER

In accordance with duly approved Statute 5.07 of the University, the Hon'ble Vice Chancellor has constituted the Board of Studies for B.Tech. (Computer Science & Engineering), B.Tech. (Hons.) Computer Science & Engineering with specializations (AI&ML, DS&ML, Cyber Security) and Bachelor of Computer Applications (BCA) programmes under Himalayan School of Science & Technology, as under:

Dr. R.C. Ramola, Professor & Principal - Himalayan School of Science & Technology		Chairperson
As per the provisions of Statute 5.07(c) of the University, Associate Professor nominated by the Vice Chancellor	Dr. Mukesh Bijalwan, Associate Professor, Himalayan School of Science & Technology	Member
As per the provisions of Statute 5.07(d) of the University, 02 (Two) external subject experts nominated by the Vice Chancellor	Dr. Durga Toshniwal, Professor, IIT Roorkee	Member
	Dr. Manoj Misra, Professor, IIT Roorkee	Member
Special Invitee(s)	Dr. Deepak Srivastava, Asstt. Professor, Himalayan School of Science & Technology	
	Mr. Gaurav Sharma, Asstt. Professor, Himalayan School of Science & Technology	

By Order,

Registrar

Copy to: Hon'ble Chancellor
            Hon'ble Vice Chancellor   } for kind information please
            Chairperson, Board of Studies
            All above concerned

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Swami Rama Himalayan University
Office of the Registrar

SRHU/Reg/Int/2023-223

Date: 5th May, 2023

Meeting Notice

The Meeting of the **Board of Studies** for B.Tech. (Computer Science & Engineering), B.Tech. (Hons.) Computer Science & Engineering with specializations (AI&ML, DS&ML, Cyber Security) and Bachelor of Computer Applications (BCA) programmes under Himalayan School of Science & Technology (HSST), will be held on **13th May 2023 (Saturday) at 11:30 AM.**

The 'Agenda' of the meeting shall be as follows:

1. To recommend, upon reference to it by the faculty, the courses of study, curriculum and methods of assessment in the subject or group of subjects within its purview.

2. To recommend programme objective and course outcome.

3. To recommend books, including text-books, supplementary reading, reference books and other study material for such courses of study.

4. To advise the faculty or faculties concerned regarding improvements in the courses of study.

5. To recommend organization of orientation and refresher courses in the subject.

All concerned members of the said 'Board of Studies' are requested to please make it convenient to attend the meeting.

5/5/23

Dr. Susheela Sharma
Registrar

Copy to: Hon'ble Chancellor ⎱
Hon'ble Vice Chancellor ⎰ for kind information please
Principal, HSST
Chairperson, Board of Studies
All concerned members of the Board of Studies

Board of Studies (Attendance)

Board of Studies of Bachelor of Technology in Computer Science & Engineering was conducted on 13th May, 2023 (Saturday) in the online mode.

S. No.	Name	Signature
1	**Dr. Ramesh Chand Ramola** Principal, HSST (Chairperson)	
2	**Dr. Mukesh Bijalwan** Associate Professor HSST (Member)	
3	**Dr. Durga Toshniwal** Professor, Deptt. of Computer Science & Engineering IIT-Roorkee (Member)	
4	**Dr. Manoj Misra** Professor, Deptt. of Computer Science & Engineering IIT-Roorkee (Member)	
5	**Dr. Deepak Srivastava** Asstt. Professor HSST (Special Invitee)	
6	**Mr. Gaurav Sharma** Asstt. Professor HSST (Special Invitee)	
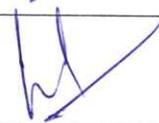
Minutes of the Meeting

In pursuance to the notification SRHU/Reg./Int./2023-223 dated 5th May, 2023 the meeting of Board of Studies for B. Tech. in Computer Science and Engineering was held in the HSST on 13th May, 2023 at 11:30 am in the presence of following members in the online mode.

1. Dr. Ramesh Chand Ramola: Chairperson
2. Dr. Mukesh Bijalwan: Member
3. Dr. Durga Toshniwal: Member
4. Dr. Manoj Misra: Member
5. Dr. Deepak Srivastava: Special Invitee
6. Mr. Gaurav Sharma: Special Invitee

In the meeting curriculum, methods of assessment in the subject, programme objective, course outcome, books, including text-books and reference books were discussed.

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Suggestions by expert members:

1. Some specialized subjects should be the part of the program structure as compulsory subjects.
2. In one semester, not more than one programming language should be introduced.
3. Number of labs should be reduced in 5th Semester.

Following suggestions from the expert members are incorporated:

1. Removed lab from the course titled 'Fundamental of Computer & IT in 1st Semester.
2. Reduced 2-hours of lab in course 'Programming for Problem Solving' in 1st Semester.
3. Replaced the course 'Python programming' to the new course titled as 'Introduction to IT Verticals' of 3-credits in 2nd Semester.
4. Replaced 'Java Programming' course to the 'Python Programming' course which is to be shifted from semester-II to semester-III of same credits in 3rd Semester.
5. Reduced 2-hours of lab in 'Data Structures' in 3rd Semester.
6. Replaced 'Design and Analysis of Algorithms' course of credit-5 to the new course titled 'Introduction to Machine Learning' of 4- credits in 4th Semester.
7. 'Unix and Shell Programming' course of 3-credits is completely removed from the curriculum and shift 'Java Programming' of credit-4 from semester-III to semester-IV.
8. Seminar-I of credit-1 is completely removed from curriculum in 4th Semester.
9. Removed Lab of 2-hours in 'Cloud Computing & Virtualization' course in 5th Semester.
10. Replaced 'Web Technology' course of credit-4 to the course 'Design and Analysis of Algorithms' of 5-credits which is to be shifted from semester-IV.
11. Removed Lab of 2-hours in course 'Computer Networks' in 5th Semester.
12. Replaced seminar-II to the seminar in 5th Semester.
13. Removed Lab of 2-hours in course 'Computer Graphics' in 6th Semester.
14. Completely removed 'Accounting and Finance' course of 3-credits and replaced it with the course 'Web Technology' of 4-credits which is to be from semester-V to the semester-VI.

Dr. Ramesh Chand Ramola
Chairperson

Dr. Mukesh Bijalwan
Member

Dr. Durga Toshniwal
Member

Dr. Manoj Misra
Member

Dr. Deepak Srivastava
Special Invitee

Mr. Gaurav Sharma
Special Invitee

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Program- B.Tech. (Computer Science & Engineering)

Programme Educational Objectives (PEOs)

The Programme Educational Objectives of B.Tech. CSE programmes are

PEO1 To prepare the graduates having a strong background of Basic Science, Mathematics & Engineering and ability to use these tools.

PEO2 To prepare the graduates who can demonstrate technical competence in the field of computer science & engineering and develop solutions to the real-time problems

PEO3: To prepare the graduates to adapt themselves for life-long learning through professional activities on latest technology and trends needed for a successful career.

Program Outcomes (POs)

On successful completion of B.Tech. CSE programme, the students are expected to

PO1 **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

	Program Specific Outcomes (PSOs)
	At the end of the programme, the student should be able to
PSO1	Identify suitable algorithms to design, develop and evaluate effective solutions for real-life and research problems.
PSO2	Excel in various programming/project competitions and technological challenges laid by industry/ professional societies.
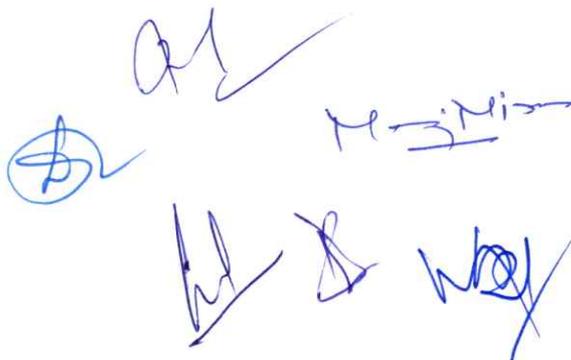
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Study & Evaluation Scheme

SWAMI RAMA HIMALAYAN UNIVERSITY

Himalayan School of Science & Technology

Study and Evaluation Scheme: B. Tech.-CSE Programme (with effective from 2023-2024)

1 YEAR SEM-I

S. No.	Course Code (Theory)	Course Code (Practical/Practices)	Course Title	Category	Periods L	T	P	Theory SE-I	SE-II	DDA	ESE	Total	Practical/Practices Internal	ESE	Total	Grand Total	Contact Hours (L+T+P)	Credits Theory	Practical/Practices	Total
1	BST111		Mathematics I	AECC	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST111		Fundamental of Computer & IT	CC	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
3	CST112	CSP112	Programming for Problem Solving	CC	3	1	2	20	20	10	100	150	20	30	50	200	6	4	1	5
4	BST112	BSP112	Basic Electronic Engineering	AECC	3	1	2	20	20	10	100	150	20	30	50	200	6	4	1	5
5	HST111	HSP111	English-I	AECC	3	0	2	20	20	10	100	150	20	30	50	200	5	4	0	0
6	HST112		Environmental Studies	AECC	3	0	0	20	20	10	100	150	0	0	0	150	3	0	0	0
7			Science of Joyful Living/Yoga & Health/Sports & Activities	PP	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0
			TOTAL		18	3	8	120	120	60	600	900	60	90	150	1050	29	15	02	17

1 YEAR SEM-II

S. No.	Course Code (Theory)	Course Code (Practical/Practices)	Course Title	Category	Periods L	T	P	Theory SE-I	SE-II	DDA	ESE	Total	Practical/Practices Internal	ESE	Total	Grand Total	Contact Hours (L+T+P)	Credits Theory	Practical/Practices	Total
1	BST121		Mathematics II	AECC	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST121		Software Engineering	CC	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
3	CST122	CSP122	Object Oriented Programming Using C++	CC	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
4	CST123		Introduction to IT Verticals	CC	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
5	CST124	CSP124	Digital Electronics	CC	3	1	2	20	20	10	100	150	20	30	50	200	6	4	1	5
6	HST121		Human Values & Professional Ethics	AU	2	0	0	20	20	10	50	100	0	0	0	100	2	0	0	0
7			Science of Joyful Living/Yoga & Health/Sports & Activities	PP	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0
			TOTAL		17	3	6	120	120	60	550	850	40	60	100	950	26	18	2	20

L: Lecture, T: Tutorial, P:Practical/Practices, SE: Sessional Examination, DDA: Day to Day Assessment (A/G/S/P/Q/V: Assignment/Group Discussion/ Seminar/ Presentation/ Quiz/ Viva Voce) ESE: End Semester Examination

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2 YEAR SEM-III

S. No.	COURSE CODE Theory	COURSE CODE Practical / Practices	Category	COURSE TITLE	Periods L	T	P	EVALUATION SCHEME THEORY SE-I	SE-II	DDA	ESE	Total	Practical / Practices Internal	ESE	Total	GRAND TOTAL	Contact Hours (L+T+P)	CREDITS Theory	Practical / Practices	Total
1	BST231		AECC	Discrete Mathematics	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST231		CC	Computer System Architecture	3	1	0	20	20	10	100	150	0	0	0	150	3	4	0	4
3	CST232	CSP232	CC	Operating System	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
4	CST233	CSP233	CC	Data Structures	3	1	2	20	20	10	100	150	20	30	50	200	6	4	1	5
5	CST234	CSP234	CC	Python Programming	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
6		SEP231#	SEC	Soft Skills -I	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0
				TOTAL	15	3	8	100	100	50	500	750	60	90	150	900	25	18	3	21

2 YEAR SEM-IV

S. No.	COURSE CODE Theory	COURSE CODE Practical / Practices	Category	COURSE TITLE	Periods L	T	P	EVALUATION SCHEME THEORY SE-I	SE-II	DDA	ESE	Total	Practical / Practices Internal	ESE	Total	GRAND TOTAL	Contact Hours (L+T+P)	CREDITS Theory	Practical / Practices	Total
1	BST241		AECC	Probability and Statistics	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST241	CSP241	CC	Database Management Systems	3	1	2	20	20	10	100	150	20	30	50	200	6	4	1	5
3	CST242	CSP242	CC	Introduction to Machine Learning	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
4	CST243		CC	Theory of Computation	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
5	CST244	CSP244	CC	Java Programming	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
6		SEP241#	SEC	Soft Skills-II	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0
				TOTAL	15	3	08	100	100	50	500	750	60	90	150	900	26	18	3	21

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3 YEAR SEM-V

S. No.	Course Code Theory	Course Code Practical/Practices	Category	Course Title	Periods L	T	P	Theory SE-I	SE-II	DDA	ESE	Total	Practical Internal	ESE	Total	Grand Total	Contact Hours (L+T+P)	Credits Theory	Practical/Practices	Total
1	CST351		CC	Compiler Design	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST352		CC	Cloud Computing & Virtualization	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
3	CST353	CSP353	CC	Design and Analysis of Algorithms	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
4	CST354		CC	Computer Networks	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
5	HST351		AECC	English-II	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
6		PPS351	PP	Seminar	0	0	2	Presentation & Report					20	30	50	50	2	0	1	1
				TOTAL	15	3	4	100	100	50	500	750	20	30	100	850	22	18	02	20

3 YEAR SEM-VI

S. No.	Course Code Theory	Course Code Practical/Practices	Category	Course Title	Periods L	T	P	Theory SE-I	SE-II	DDA	ESE	Total	Practical Internal	ESE	Total	Grand Total	Contact Hours (L+T+P)	Credits Theory	Practical/Practices	Total
1	CST361		CC	Computer Graphics	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
2	CST362		CC	Introduction to Internet of Things	3	1	0	20	20	10	100	150	0	0	0	150	4	4	0	4
3	CST363		CC	Data Mining And Warehousing	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
3	CST364	CSP364	CC	Web Technology	3	0	2	20	20	10	100	150	20	30	50	200	5	3	1	4
5	CET36*		DSEC	Core Elective - I	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
6		PPP361	PP	Minor Project	0	0	8	Report, Analysis, Design, Implementation/ Simulation & Presentation				50	External Assessment		100	150	8	0	4	4
				TOTAL	15	2	10	100	100	50	500	800	20	30	150	950	27	17	5	22
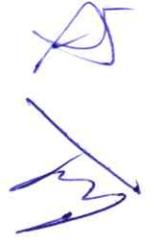
4 YEAR SEM-VII

S. No.	COURSE CODE Theory Practical / Practices	Category	COURSE TITLE	Periods L	T	P	THEORY SE-I	SE-II	DDA	ESE	Total	Practical / Practices Internal	ESE	Total	GRAND TOTAL	Contact Hours (L+T+P)	CREDITS Theory	Practical / Practices	Total
1	CET47*	DSEC	Core Elective – II	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
2	CET47*	DSEC	Core Elective – III	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
3	OET47*	GEC	Open Elective- I	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
4	PPP471	PP	Major Project I	0	0	12	Synopsis, Literature Survey, Design & Presentation				50	External Assessment		100	150	12	0	6	6
5	PPI471##	PP	Industrial Training / Certification	0	0	10	Presentation & Report							100	100	10	0	5	5
	TOTAL			9	0	22	60	60	30	300	500	0	0	200	700	31	09	11	20

4 YEAR SEM-VIII

S. No.	COURSE CODE Theory Practical / Practices	Category	COURSE TITLE	Periods L	T	P	THEORY SE-I	SE-II	DDA	ESE	Total	Practical / Practices Internal	ESE	Total	GRAND TOTAL	Contact Hours (L+T+P)	CREDITS Theory	Practical / Practices	Total
1	CET48*	DSEC	Core Elective – IV	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
2	OET48*	GEC	Open Elective – II	3	0	0	20	20	10	100	150	0	0	0	150	3	3	0	3
3	PPP481	PP	Major Project II	0	0	28	Report, Analysis, Implementation/ Simulation & Presentation				200	External Assessment		400	600	28	0	14	14
	TOTAL			6	0	28	40	40	20	200	500	00	00	400	900	34	6	14	20
###	PPI481	PP	Industry-Based Learning Program				Report, Analysis, Design, Implementation/ Simulation & Presentation					External Assessment		500	900		0	20	20

The Soft Skills is for enhancing the skills for placement. It will not appear in grade card of the students.

Industrial Training/Certification will be conducted during summers after sixth semester and its evaluation will be done in seventh semester. It will be of approximately 5-6 weeks.

Course Credits earned are equivalent to the credits earned by the Campus Students.

SUMMARY OF CREDITS

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Credit	17	20	21	21	20	22	20	20	161

Total credits to be earned for the award of Degree : 161

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CORE ELECTIVE I

S. No.	Course Code	Course Title	L	T	P	C
1	CET361	Introduction to Classical Cryptography & Number Theory	3	0	0	3
2	CET362	Introduction to Artificial Intelligence	3	0	0	3
3	CET363	Introduction to Data Science	3	0	0	3
4	CET364	Introduction to DevOps	3	0	0	3

CORE ELECTIVE II

S. No.	Course Code	Course Title	L	T	P	C
1	CET471	Asymmetric Key Cryptography and Network Security	3	0	0	3
2	CET472	Natural Language Processing	3	0	0	3
3	CET473	Data Visualization technique and tools	3	0	0	3
4	CET474	Blockchain Technologies and Applications	3	0	0	3

CORE ELECTIVE III

S. No.	Course Code	Course Title	L	T	P	C
1	CET475	Cyber Security Ethics & Laws	3	0	0	3
2	CET476	Artificial Neural Network and Deep Learning	3	0	0	3
3	CET477	Big Data Analytics	3	0	0	3
4	CET478	Reinforcement Learning	3	0	0	3

CORE ELECTIVE IV

S. No.	Course Code	Course Title	L	T	P	C
1	CET481	Ethical Hacking	3	0	0	3
2	CET482	to Pattern Recognition	3	0	0	3
3	CET483	Business Intelligence	3	0	0	3
4	CET484	Introduction to Bioinformatics	3	0	0	3

OPEN ELECTIVE

S. No.	Course Code	Course Title	L	T	P	C
		Open Elective I				
1	OET471	Digital Signal Processing	3	0	0	3
2	OET472	Embedded Systems	3	0	0	3
3	OET473	Operations Research	3	0	0	3
		Open Elective II				
1	OET481	Entrepreneurship Development	3	0	0	3
2	OET482	Principles of Management	3	0	0	3
3	OET483	Disaster Management	3	0	0	3

The Generic Elective courses may be conducted online/ offline in credit transfer mode either using UGC-MEeitY (Ministry of Electronics & Information Technology) platform or MOOCS through Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) Portal or as prescribed by the Department, pursuant to relevant staff, resources and current topic of interest considerations in the related domains.

Categories with their Credit Percentage		
Category	**Credits**	**%**
Ability Enhancement Compulsory Course	24	14.90
Core Courses	89	55.27
Professional Practices	30	18.63
Skill Enhancement Course	0	0
Generic Elective Course	6	3.72
Discipline Specific Elective Course	12	7.45
Audit Course	0	0
Total	**161**	**100**