KURUKSHETRA UNIVERSITY, KURUKSHETRA

(ESTABLISHED BY THE STATE LEGISLATURE ACT XII OF 1956)
('A+' GRADE NAAC ACCREDITED)

Scheme & Syllabus
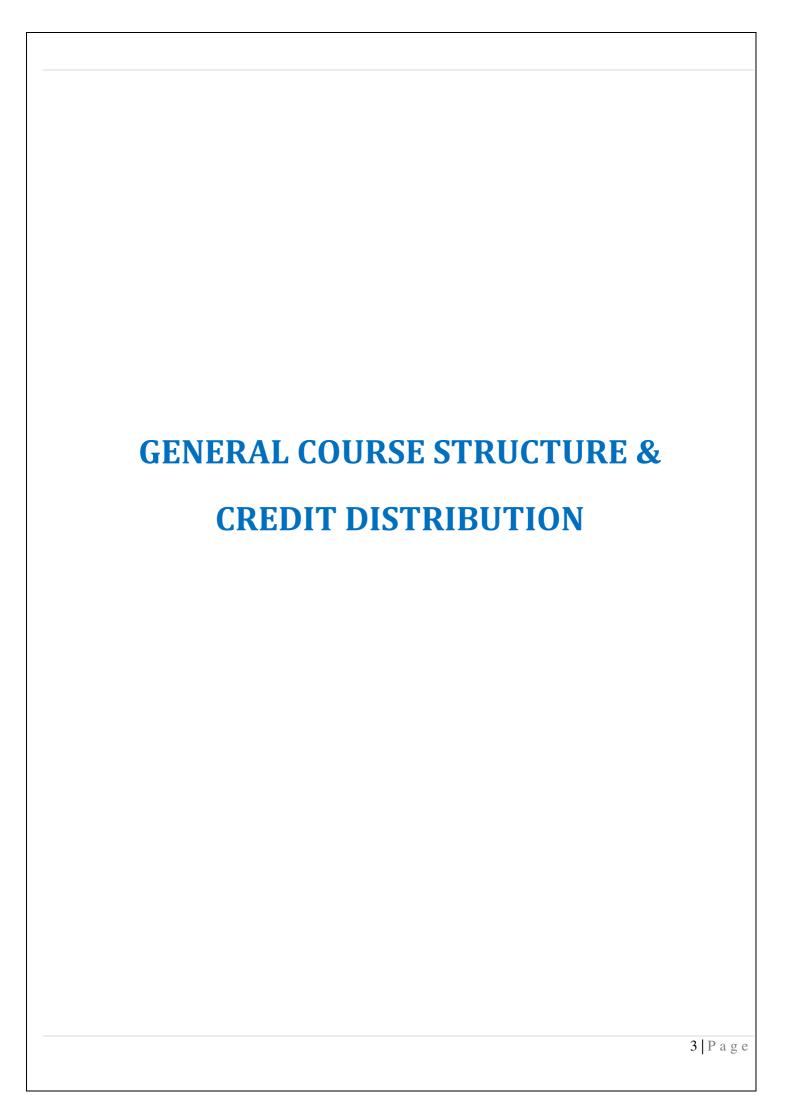# of
B.Tech. Degree
in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)

(w.e.f. session 2023-24 onwards)

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GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit*:

1Hr. Lecture(L) per week	1Credit
1Hr.Tutorial(T)per week	1Credit
1Hr.Practical(P)per week	0.5Credit
2HoursPractical(P)per week	1Credit

*Except for mandatory and value added courses

B. Range of Credits: The total number of credits proposed for the four-year B.Tech. degree in Computer Science and Engineering (Artificial Intelligence and Machine Learning) is kept as 172. In addition to this, for B.Tech. with Honors & specialization/minor degree, the student has to acquire additional 18-20 credits through MOOC courses offered at SWAYAM/NPTEL portal.

C. Structure of UG Program in Computer Science and Engineering (Artificial Intelligence and Machine Learning)**:**The structure of UG program in Computer Science and Engineering (Artificial Intelligence and Machine Learning)has essentially the following categories of courses with the breakup of credits as given:

Sr. No.	Category	Credit Breakup for CAM
1	Humanities and Social Sciences including Management courses	7.5
2	Basic Science courses	23
3	Engineering Science courses including workshop, drawing, basics of electronics/ electrical/mechanical/computer etc.	16.5
4	Professional core courses	81
5	Program Elective courses relevant to chosen specialization/branch	15
6	Open subjects–Electives from other technical and/or emerging subjects	06
7	Project work, seminar and internship in industry or else where	16
8	Mandatory and Audit Courses [IDEA Workshop, IDEA Workshop Lab, Personality Development and Soft Skills, Environmental Studies, Induction Program, Constitution of India, Essence of Indian Knowledge Tradition, NCC/NSS/Sports/ Yoga/ Technical or Cultural Club/ Society Activities]	07
	Total	**172**

D. Course code and definition:

Course code	Definitions
L:T:P	Lecture: Tutorial: Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSC/HSM	Humanities and Social Sciences including Management courses
CAM	Program Core Courses
PCA	PROFESSIONAL Elective Courses
OCA	Open Elective Courses
VAC	Value Added Courses
MAC	Mandatory Courses

➢ **Category-wise Courses**

HUMANITIES & SOCIALSCIENCE SCOURSES [HSC/HSM]

S.No	Course No./ Code	Subject	Semester	Hrs/week			Credits
				Lecture	Tutorial	Practical	
1	B23-HSC-101	English for Technical Writing	II	2	0	2	3
2	B23-HSM-101	Universal Human Values-II: Understanding Harmony And Ethical Human Conduct	I	3	0	0	3
3	B23-HSC-102	Design Thinking	I	0	0	3	1.5
		Total Credits					7.5

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BASIC SCIENCE COURSES [BSC]

S. No	Course No./ Code	Subject	Semester	Hrs/week			Credits
				Lecture	Tutorial	Practical	
1	B23-BSC-101	Semiconductor Physics	I	3	1	2	5
2	B23-BSC-107	Mathematics-I	I	3	1	0	4
3	B23-BSC-104	Engineering Chemistry	II	3	0	2	4
4	B23-BSC-108	Mathematics-II	II	3	1	0	4
5	B23-BSC-106	Biology	II	3	0	0	3
6	B23-BSC-205	Mathematical Concepts for AI	III	3	0	0	3
		Total Credits					23

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ENGINEERING SCIENCE COURSE[ESC]

S. No	Course No./ Code	Subject	Semester	Hrs/week			Credits
				Lecture	Tutorial	Practical	
1	B23-ESC-104	Basic Electrical Engineering	I	3	1	2	5
2	B23-ESC-102	Engineering Graphics and Design	I	1	0	4	3
3	B23-ESC-101	Programming for Problem Solving	II	3	0	2	4
4	B23-ESC-107	Manufacturing Processes Workshop	II	0	0	3	1.5
5	B23-ESC-220	Internet of Things	IV	3	0	0	3
		Total Credits					16.5

PROGRAM CORE COURSES[CAM]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1	B23-CAM-201	Data Structures	III	3:0:0	3
2	B23-CAM-203	Modern Computer Architecture	III	3:0:0	3
3	B23-CAM-205	Object Oriented Programming	III	3:0:0	3
4	B23-CAM-207	IT Workshop (Python)	III	2:0:0	2
5	B23-CAM-209	Artificial Intelligence	III	3:0:0	3
6	B23-CAM-211	Data Structures Lab	III	0:0:4	2
7	B23-CAM-213	Object Oriented Programming Lab	III	0:0:4	2
8	B23-CAM-215	IT Workshop (Python) Lab	III	0:0:4	2
9	B23-CAM-202	Introduction to Machine Learning	IV	3:0:0	3
10	B23--CAM-206	Design and Analysis Algorithms	IV	3:1:0	4
11	B23--CAM-208	Data Base System	IV	3:0:0	3
12	B23--CAM-210	Machine Learning Lab	IV	0:0:4	2
13	B23--CAM-212	Design & Analysis Algorithms Lab	IV	0:0:4	2
14	B23--CAM-214	DBS Lab	IV	0:0:4	2
15	B23--CAM-301	Web and Internet Technology	V	3:0:0	3
16	B23--CAM-303	Interactive Computer Graphics	V	3:0:0	3
17	B23--CAM-305	Advance Machine Learning	V	3:1:0	4
18	B23--CAM-307	Operating Systems	V	3:0:0	3
19	B23--CAM-309	Web and Internet Technology Lab	V	0:0:4	2
20	B23--CAM-311	ICG Lab	V	0:0:4	2
21	B23--CAM-313	Machine Learning Lab-II	V	0:0:4	2
22	B23--CAM-315	Industrial Training-I	V	0:0:0	0
23	B23--CAM-302	Computer Networks	VI	3:0:0	3
24	B23--CAM-304	Big Data Analytics	VI	3:0:0	3
25	B23--CAM-306	Optimization Techniques in Machine Learning	VI	3:0:0	3
26	B23--CAM-308	Computer Networks Lab	VI	0:0:4	2
27	B23--CAM-310	Big Data Analytics Lab	VI	0:0:4	2
28	B23--CAM-401	Cloud Computing	VII	3:0:0	3
29	B23--CAM-403	Soft Computing	VII	3:0:0	3
30	B23--CAM-405	Software Engineering	VII	3:0:0	3
31	B23--CAM-407	Cloud Computing Lab	VII	0:0:4	2
32	B23--CAM-409	Soft Computing Lab	VII	0:0:4	2
33	B23--CAM-413	Industrial Training-II	VII	0:0:0	0
Total					**81**

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SKILL ENHANCEMENT BASED PROJECTWORK,SEMINAR AND INTERNSHIP

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1	B23-CAM-312	Project-I	VI	0:0:4	2
2	B23-CAM-411	Project-II	VII	0:0:8	4
3	B23-CAM-402	Project-III / Industrial Project/ Research Lab/ /Start ups / Entrepreneurship	VIII	0:0:20	10
4	B23-CAM-315	Industrial Training-I	V	0:0:0	0
5	B23-CAM-413	Industrial Training-II	VII	0:0:0	0
		Total			**16**

PROFESSIONAL ELECTIVES[PCA]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1		PCA-I	**PROFESSIONAL ELECTIVE-I**	VI	3:0:0
2		PCA-II	**PROFESSIONAL ELECTIVE-II**	VI	3:0:0
3		PCA-III	**PROFESSIONAL ELECTIVE-III**	VII	3:0:0
4		PCA-IV	**PROFESSIONAL LECTIVE- IV**	VIII	3:0:0
5		PCA-V	**PROFESSIONAL ELECTIVE-V**	VIII	3:0:0
		Total			**15**

LIST OFPROFESSIONAL ELECTIVE COURSES [PCA]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1	B23-PCA-314	Android and Mobile App Development	VI	3:0:0	3
2	B23- PCA-316	Data and Visual Analytics in AI	VI	3:0:0	3
3	B23- PCA-318	Natural Language Processing	VI	3:0:0	3
4	B23- PCA-320	Image and Video Processing	VI	3:0:0	3
5	B23- PCA-322	Deep Learning	VI	3:0:0	3
6	B23- PCA-324	Data Mining	VI	3:0:0	3
7	B23- PCA-415	Machine Learning for Data Science	VII	3:0:0	3
8	B23- PCA-417	Unix and Linux Programming	VII	3:0:0	3
9	B23- PCA-419	Simulation and Modelling	VII	3:0:0	3
10	B23- PCA-404	Agile Software Engineering	VIII	3:0:0	3
11	B23- PCA-406	Software Verification, Validation and Testing	VIII	3:0:0	3
12	B23- PCA-408	Software Project Management	VIII	3:0:0	3
13	B23- PCA410	Social Networks	VIII	3:0:0	3
14	B23- PCA-412	AI and Robotics	VIII	3:0:0	3
15	B23- PCA-414	Neural Network and Fuzzy Logic	VIII	3:0:0	3
16	B23- PCA-416	Health Care and Analytics	VIII	3:0:0	3

OPEN ELECTIVES[OCA]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1		OCA-1	**OPEN ELECTIVE-I**	3:0:0	IV
2		OCA-II	**OPEN ELECTIVE-II**	3:0:0	V
		Total			**6**

LIST OF OPEN ELECTIVE COURSES [OCA]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1	B23-OCA-202	Intellectual Property Rights (IPR) and Regulatory	IV	3:0:0	3
2	B23-OCA-204	International and Corporate Law	IV	3:0:0	3
3	B23-OCA-206	Cyber Law and Ethics-	IV	3:0:0	3
4	B23-OCA-301	Digital Electronics	V	3:0:0	3
5	B23-OCA-303	Innovation, Start ups and Entrepreneurship	V	3:0:0	3
6	BC23-OCA-305	Bioinformatics	V	3:0:0	3

VALUE ADDED AND MANDATORY COURSES [VAC/MAC]

S. No.	Course No./ Code	Subject	Semester	Hrs/Week L:T:P	Credits
1	B23-VAC-101	Personality Development and Soft Skills	II	2:0:0	1
2	B23-VAC-110	IDEA Workshop	I	2:0:0	1
3	B23-VAC-112	IDEA Project Workshop	I	0:0:2	1
4	B23-VAC-401/403/405/407/409/411	NCC/NSS/Sports/ Yoga/ Technical or Cultural Club/Society activities	VII	0:0:2	1
5	B23-MAC-201	Environmental Studies	IV	2:0:0	1
6	B23-MAC-202	Essence of Indian Traditional Knowledge	III	2:0:0	1
7	B23-MAC-301	Constitution of India	V	2:0:0	1
		Total			**7**

SEMESTER WISE STRUCTURE

B.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning)
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SEMESTER I

S.No.	Course No./Code	Subject	L:T:P	Hours/ Week	Credits	End Semester Exam	Internal assessment	Practical exam	Total	Duration of exam (Hours)
1	B23-BSC-101	Semiconductor Physics	3:1:0	4	4	70	30	--	100	3
2	B23-HSM-101	Universal Human Values-II: Understanding Harmony and Ethical Human conduct	3:0:0	3	3	70	30	--	100	3
3	B23-ESC-102	Engineering Graphics and Design	1:0:0	1	1	70	30	--	100	3
4	B23-ESC-104	Basic Electrical Engineering	3:1:0	4	4	70	30	--	100	3
5	B23-BSC-107	Mathematics-I	3:1:0	4	4	70	30	--	100	3
6	B23-BSC-111	Semiconductor Physics Lab	0:0:2	2	1	--	40	60	100	3
7	B23-ESC-106	Engineering Graphics and Design Lab	0:0:4	4	2	--	40	60	100	3
8	B23-ESC-109	Basic Electrical Engineering Lab	0:0:2	2	1	--	40	60	100	3
9	B23-VAC-110	IDEA Workshop	2:0:0	2	1	--	100	--	100	3
10	B23-VAC-112	IDEA Project Workshop	0:0:2	2	1	--	100	--	100	3
11	B23-HSC-102	Design Thinking	0:0:3	3	1.5	-	100	--	100	3
		TOTAL		**30**	**23.5**	**350**	**570**	**180**	**1100**	**-**

Note:
➢ NCC/NSS/Sports/Yoga/Technical/cultural club/society activities will be joined by students in first year and will be evaluated in 7th semester by the institute based upon continuous evaluation model as per guidelines.

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SEMESTER II

S.No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of exam (Hours)
						End Semester	Internal assessment	Practical Exam	Total	
1	B23-HSC-101	English for Technical Writing	2:0:0	2	2	70	30	--	100	3
2	B23-ESC-101	Programming for Problem Solving	3:0:0	3	3	70	30	--	100	3
3	B23-BSC-104	Engineering Chemistry	3:0:0	3	3	70	30	--	100	3
4	B23-BSC-108	Mathematics-II	3:1:0	4	4	70	30	--	100	3
5	B23-BSC-106	Biology	3:0:0	3	3	70	30	--	100	3
6	B23-HSC-103	English Language Lab	0:0:2	2	1	--	40	60	100	3
7	B23-ESC-105	Programming for Problem Solving Lab	0:0:2	2	1	--	40	60	100	3
8	B23-ESC-107	Manufacturing Processes Workshop	0:0:3	3	1.5	--	40	60	100	3
9	B23-ESC-114	Engineering Chemistry Lab	0:0:2	2	1	--	40	60	100	3
10	B23-VAC-101	Personality Development and Soft Skills	2:0:0	2	1	--	100	--	100	3
		TOTAL		**26**	**21.5**	**350**	**410**	**240**	**1000**	

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SEMESTER-III

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B23-CAM-201	Data Structures	3:0:0	3	3	70	30	0	100	3
2	B23-CAM-203	Modern Computer Architecture	3:0:0	3	3	70	30	0	100	3
3	B23-CAM-205	Object Oriented Programming	3:0:0	3	3	70	30	0	100	3
4	B23-CAM-207	IT Workshop (Python)	2:0:0	2	2	70	30	0	100	3
5	B23-BSC-205	Mathematical Concepts for AI	3:0:0	3	3	70	30	0	100	3
6	B23-CAM-209	Artificial Intelligence	3:0:0	3	3	70	30	0	100	3
7	B23-CAM-211	Data Structures Lab	0:0:4	4	2	0	40	60	100	3
8	B23-CAM-213	Object Oriented Programming Lab	0:0:4	4	2	0	40	60	100	3
9	B23-CAM-215	IT Workshop (Python) Lab	0:0:4	4	2	0	40	60	100	3
10	B23-MAC-202	Essence of Indian Traditional Knowledge	**2:0:0**	**2**	**1**	**--**	**100**	**0**	**100**	**3**
		TOTAL		**31**	**24**	**420**	**400**	**180**	**1000**	

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SEMESTER-IV

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B23-CAM-202	Introduction to Machine Learning	3:0:0	3	3	70	30	0	100	3
2	B23-ESC-220	Internet of Things	3:0:0	3	3	70	30	0	100	3
3	B23-CAM-206	Design and Analysis Algorithms	3:1:0	4	4	70	30	0	100	3
4	B23-CAM-208	Data Base System	3:0:0	3	3	70	30	0	100	3
5	--	Open Elective-I	3:0:0	3	3	70	30	0	100	3
6	B23-CAM-210	Machine Learning Lab	0:0:4	4	2	0	40	60	100	3
7	B23-CAM-212	Design & Analysis Algorithms Lab	0:0:4	4	2	0	40	60	100	3
8	B23-CAM-214	DBS Lab	0:0:4	4	2	0	40	60	100	3
9	B23-MAC-201	Environmental Studies	2:0:0	2	1	--	100	0	100	3
TOTAL				30	23	350	370	180	900	

Note:

➢ All students have to undertake the industrial training for 6 to 8 weeks after 4th semester which will be evaluated in 5th semester.

➢ The course of Open Elective will be offered at 1/3rd strength or 20 students (whichever is smaller) of the section.

Open Elective –I	
Intellectual Property Rights (IPR) and Regulatory	B23-OCA-202
International and Corporate Law	OE23-OCA-204
Cyber Law and Ethics-	OE23-OCA-206

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SEMESTER-V

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B23-CAM-301	Web and Internet Technology	3:0:0	3	3	70	30	0	100	3
2	B23-CAM-303	Interactive Computer Graphics	3:0:0	3	3	70	30	0	100	3
3	B23-CAM-305	Advance Machine Learning	3:1:0	4	4	70	30	0	100	3
4	B23-CAM-307	Operating Systems	3:0:0	3	3	70	30	0	100	3
5	---	Open Elective-II	3:0:0	3	3	70	30	0	100	3
6	B23-CAM-309	Web and Internet Technology Lab	0:0:4	4	2	0	40	60	100	3
7	B23-CAM-311	ICG Lab	0:0:4	4	2	0	40	60	100	3
8	B23-CAM-313	Machine Learning Lab-II	0:0:4	4	2	0	40	60	100	3
9	B23-CAM-315	Industrial Training-I	0:0:0	0	0	--	100	--	100	3
10	B23-MAC-301	Constitution of India	2:0:0	2	1	--	100	0	100	3
	TOTAL			30	23	350	470	180	1000	

Note:
- ➤ B23-CAM-315 is a mandatory non-credit course in which the students will be required to get passing marks.
- ➤ ThecourseofbothProgramElectiveandOpenElectivewillbeofferedat1/3rdstrengthor20students(whichever is smaller)of the section.

Open Elective-II	
Digital Electronics	B23-OCA-301
Innovation, Start-ups and Entrepreneurship	B23-OCA-303
Bioinformatics	B23-OCA-305

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SEMESTER-VI

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration of exam (Hours)
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B23-CAM-302	Computer Networks	3:0:0	3	3	70	30	0	100	3
2	B23-CAM-304	Big Data Analytics	3:0:0	3	3	70	30	0	100	3
3	---	Professional Elective-I	3:0:0	3	3	70	30	0	100	3
4	---	Professional Elective-II	3:0:0	3	3	70	30	0	100	3
5	B23-CAM-306	Optimization Techniques in Machine Learning	3:0:0	3	3	70	30	0	100	3
6	B23-CAM-308	Computer Networks Lab	0:0:4	4	2	0	40	60	100	3
7	B23-CAM-310	Big Data Analytics Lab	0:0:4	4	2	0	40	60	100	3
8	B23-CAM-312	Project-I	0:0:4	4	2	0	40	60	100	3
		TOTAL		**27**	**21**	**350**	**270**	**180**	**800**	

Note:

➢ ThecourseofbothProfessionalElectiveandOpenElectivewillbeofferedat1/3rdstrength or20 students(whichever is smaller)of the section.

➢ All students have to undertake the industrial training for 6 to 8 weeks after 6th semester which will be evaluated in 7th semester.

Professional Elective-I	Professional Elective-II
Android and Mobile App Development B23-PCA-314	Image and Video ProcessingB23-PCA-320
Data and Visual Analytics in AIB23-PCA-316	Deep Learning B23-PCA-322
Natural Language Processing B23-PCA-318	Data Mining B23-PCA-324

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SEMESTER-VII

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule(Marks)				Duration ofexam
						End Semester Exam	Internal assessment	Practical Exam	Total	
1	B23-CAM-401	Cloud Computing	3:0:0	3	3	70	30	0	100	3
2	--	Professional Elective-III	3:0:0	3	3	70	30	0	100	3
3	B23-CAM-403	Soft Computing	3:0:0	3	3	70	30	0	100	3
4	B23-CAM-405	Software Engineering	3:0:0	3	3	70	30	0	100	3
5	B23-CAM-407	Cloud Computing Lab	0:0:4	4	2	0	40	60	100	3
6	B23-CAM-409	Soft Computing Lab	0:0:4	4	2	0	40	60	100	3
7	B23-CAM-411	Project-II	0:0:8	8	4	0	100	100	200	3
8	B23-CAM-413	Industrial Training-II	0:0:0	0	0	--	100	--	100	3
9	B23-VAC-401/403/405/407/409	NCC/NSS/Sports/ Yoga/ Technical or Cultural Club/Society activities		--	1		100	--	100	
		TOTAL		**28**	**21**	**280**	**500**	**220**	**1000**	

Note:

➢ **The**courseofbothProgramElectiveandOpenElectivewillbeofferedat1/3rdstrength or20 students(whichever is smaller) of the section.

➢ B23-CAM-413 is a mandatory non-credit course in which the students will be required to get passing marks

➢ B23-VAC-401/403/405/407/409/411 are single credit value added courses in which NCC/NSS/Sports/Yoga/Technical or Cultural Club/Society activities will be joined by students in first year and will be evaluated in 7th semester by the institute based upon continuous evaluation model as per guidelines**.**

Professional Elective-III	
Machine Learning for Data Science	B23-PCA-415
Unix and Linux Programming	B23-PCA-417
Simulation and Modelling	B23-PCA-419

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SEMESTER-VIII

S. No.	Course No./Code	Subject	L:T:P	Hours/ Week	Credits	End Semester Exam	Internal assessment	Practical Exam	Total	Duration Of exam (Hours)
						Examination Schedule(Marks)				
1	--	Professional Elective-IV	3:0:0	3	3	70	30	0	100	3
2	--	Professional Elective-V	3:0:0	3	3	70	30	0	100	3
3	B23-CAM-402	Project-III / Industrial Project/ Research Lab/ /Start ups / Entrepreneurship	0:0:20	20	10		200	200	400	3
TOTAL				**26**	**16**	**140**	**260**	**200**	**600**	

Note:

➢ ThecourseofbothProfessionalElectivewillbeofferedat1/3rdstrength or 20 students(whichever is smaller)of the section.

➢ In case of semester-long project work done in industry/external institute, the Program Elective- IV and Open Elective-IV may be offered in online mode through MOOC courses offered by SWAYAM/NPTEL portal. These courses may be done from 3rd semester till completion of the degree.

➢ In case of semester-long project work done in industry the Program Elective- IV and Programme Elective-V may be offered in online mode through MOOC courses offered by SWAYAM/NPTEL

Professional Elective -IV		Professional Elective -V	
Agile Software Engineering	B23-PCA-404	Social Networks	B23-PCA-410
Software Verification, Validation and Testing	B23-PCA-406	AI and Robotics	B23-PCA-412
Software Project Management	B23-PCA-408	Neural Network and Fuzzy Logic	B23-PCA-414
		Health Care and Analytics	B23-PCA-416