

13. COURSES OF STUDY AND SCHEME OF ASSESSMENT

M Sc SOFTWARE SYSTEMS

(2020 REGULATIONS)
(TOTAL CREDITS TO BE EARNED: 212*)

Course Code	Course Title	Hours/Week			Credits	Prerequisites	Maximum marks			CAT
		L	T	P			CA	FE	Total	
I SEMESTER										
20XW11	CALCULUS AND ITS APPLICATIONS	3	2	0	4		50	50	100	BS
20XW12	ENGLISH FOR PROFESSIONAL SKILLS	3	0	0	3		50	50	100	HS
20XW13	APPLIED PHYSICS	4	0	0	4		50	50	100	BS
20XW14	ANALOG AND DIGITAL ELECTRONICS	4	0	0	4		50	50	100	BS
20XW15	PROBLEM SOLVING ANDC PROGRAMMING	4	0	0	4		50	50	100	PC
20XW16	ENGINEERING GRAPHICS AND GEOMETRIC MODELING	0	0	4	2		100	-	100	ES
20XW17	C PROGRAMMING LAB	0	0	4	2		100	-	100	PC
20XW18	APPLIED PHYSICS AND DIGITAL ELECTRONICS LAB	0	0	4	2		100	-	100	BS
20XW29	PERSONALITY AND CHARACTER DEVELOPMENT	0	0			** Refer Sem 2 and footnote				MC
Total 32 hrs		18	2	12	25		550	250	800	
II SEMESTER										
20XW21	LINEAR ALGEBRA	3	2	0	4	20XW11	50	50	100	BS
20XW22	DISCRETE STRUCTURES	3	2	0	4	20XW11	50	50	100	BS
20XW23	DATA STRUCTURES AND ALGORITHMS	3	0	0	3	20XW15	50	50	100	PC
20XW24	OBJECT ORIENTED PROGRAMMING	3	0	0	3	20XW15	50	50	100	PC
20XW25	COMPUTER ORGANIZATION	3	0	0	3	20XW14	50	50	100	PC
20XW26	DATA STRUCTURES LAB	0	0	4	2		100	-	100	PC
20XW27	OBJECT COMPUTING LAB	0	0	4	2		100	-	100	PC
20XW28	PYTHON PROGRAMMING LAB	0	0	4	2		100	-	100	PC
20XW29	PERSONALITY AND CHARACTER DEVELOPMENT	0	0		MC		**	Grade ---		MC
Total 31 hrs		15	4	12	23		550	250	800	

* Indicated is the minimum number of credits to be earned by a student.

L – Lecture; T – Tutorial / Tutorial Practice; P – Practical;

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** - Total 40 hrs in semesters I & II put together. Grade: Completed / Not Completed.

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		L	T	P			CA	FE	Total	
III SEMESTER										
20XW31	PROBABILITY & STATISTICS	3	2	0	4	20XW11	50	50	100	BS
20XW32	DATABASE MANAGEMENT SYSTEM	3	0	0	3	20XW23	50	50	100	PC
20XW33	TRANSFORM TECHNIQUES	3	2	0	4	20XW11	50	50	100	BS
20XW34	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3	20XW23	50	50	100	PC
20XW35	MICROPROCESSOR AND EMBEDDED SYSTEMS	3	0	0	3	20XW14, 20XW25	50	50	100	PC
20XW36	DESIGN AND ANALYSIS OF ALGORITHMS LAB	0	0	4	2		100	-	100	PC
20XW37	EMBEDDED SYSTEMS LAB	0	0	4	2		100	-	100	PC
20XW38	RDBMS LAB	0	0	4	2		100	-	100	PC
Total 31 hrs		15	4	12	23		550	250	800	
IV SEMESTER										
20XW41	ACCOUNTING AND FINANCIAL MANAGEMENT	4	0	0	4		50	50	100	BS
20XW42	COMPUTER NETWORKS AND TCP/IP	3	0	0	3	20XW25, 20XW28	50	50	100	PC
20XW43	OPERATIONS RESEARCH	4	0	0	4	20XW21, 20XW31	50	50	100	BS
20XW44	SOFTWARE ENGINEERING TECHNIQUES	3	2	0	4	20XW24	50	50	100	PC
20XW45	OPERATING SYSTEMS	4	0	0	4	20XW23, 20XW25, 20XW35	50	50	100	PC
20XW46	COMPUTER NETWORKS AND TCP/IP LAB	0	0	4	2		100	-	100	PC
20XW47	MATHEMATICAL COMPUTING LAB (WITH R)	0	0	4	2		100	-	100	BS
20XW48	WEB DESIGNING LAB	0	0	4	2		100	-	100	PC
Total 32 hrs		18	2	12	25		550	250	800	

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Course Code	Course Title	Hours/Week			Credits	Prerequisites	Maximum marks			CAT
		L	T	P			CA	FE	Total	
V SEMESTER										
20XW51	UNIX ARCHITECTURE AND PROGRAMMING	3	0	0	3	20XW23, 20XW25, 20XW35	50	50	100	PC
20XW52	JAVA PROGRAMMING	3	0	0	3	20XW24, 20XW45	50	50	100	PC
20XW53	MACHINE LEARNING	3	0	0	3	20XW21, 20XW31, 20XW43	50	50	100	PC
20XW54	THEORY OF COMPUTING	3	2	0	4	20XW22, 20XW23	50	50	100	BS
20XW55	PROFESSIONAL ELECTIVE I	3	2	0	4		50	50	100	PE
20XW56	UNIX SHELL AND SYSTEM PROGRAMMING LAB	0	0	4	2		100	-	100	PC
20XW57	JAVA PROGRAMMING LAB	0	0	4	2		100	-	100	PC
20XW58	MACHINE LEARNING LAB	0	0	4	2		100	-	100	PC
Total 31 hrs		15	4	12	23		550	250	800	
VI SEMESTER										
20XW61	MOBILE COMPUTING	3	0	0	3	20XW42, 20XW52	50	50	100	PC
20XW62	ARTIFICIAL INTELLIGENCE	3	0	0	3	20XW22, 20XW23, 20XW31	50	50	100	PC
20XW63	SOFTWARE PATTERNS	3	2	0	4	20XW24, 20XW44	50	50	100	PC
20XW64	PRINCIPLES OF COMPILER DESIGN	3	2	0	4	20XW23, 20XW54	50	50	100	PC
20XW65	PROFESSIONAL ELECTIVE II	3	2	0	4		50	50	100	PE
20XW66	MOBILE COMPUTING LAB	0	0	4	2		100	-	100	PC
20XW67	ARTIFICIAL INTELLIGENCE LAB	0	0	2	1		100	-	100	PC
20XW68	DISTRIBUTED ENTERPRISE COMPUTING LAB	0	0	4	2		100	-	100	PC
Total 31 hrs		15	6	10	23		550	250	800	
VII SEMESTER										
20XWP1	PROJECT WORK I	0	0	-	12		50	50	100	EEC

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Course Code	Course Title	Hours/Week			Credits	Prerequisites	Maximum marks			CAT
		L	T	P			CA	FE	Total	
VIII SEMESTER										
20XW81	INFORMATION RETRIEVAL AND WEB SEARCH	3	0	0	3	20XW21, 20XW31, 20XW34	50	50	100	PC
20XW82	DATA MINING	3	0	0	3	20XW53	50	50	100	PC
20XW83	SOFTWARE PROJECT MANAGEMENT	3	0	0	3	20XW44	50	50	100	PC
20XW84	PROFESSIONAL ELECTIVE III	3	2	0	4		50	50	100	PE
20XW85	OPEN ELECTIVE I	3	2	0	4		50	50	100	OE
20XW86	INFORMATION RETRIEVAL AND WEB SEARCH LAB	0	0	4	2		100	-	100	PC
20XW87	DATA MINING LAB	0	0	4	2		100	-	100	PC
20XW88	CAPSTONE PROJECT LAB	0	0	4	2		100	-	100	PC
Total 31 hrs		15	4	12	23		550	250	800	
IX SEMESTER										
20XW91	COMPUTER VISION AND IMAGE ANALYSIS	3	0	0	3	20XW21, 20XW23, 20XW31	50	50	100	HS
20XW92	SOFTWARE TESTING	3	0	0	3	20XW15, 20XW24	50	50	100	PC
20XW93	DEEP LEARNING	3	0	0	3	20XW53	50	50	100	PC
20XW94	PROFESSIONAL ELECTIVE IV (SELF STUDY)	3	2	0	4		50	50	100	PE
20XW95	OPEN ELECTIVE II	3	2	0	4		50	50	100	OE
20XW96	DEEP LEARNING LAB	0	0	4	2		100	-	100	PC
20XW97	COMPUTER VISION LAB	0	0	4	2		100	-	100	PC
20XW98	FUNCTIONAL PROGRAMMING LAB	0	0	4	2		100	-	100	EEC
Total 31 hrs		15	4	12	23		550	250	800	
X SEMESTER										
20XWP2	PROJECT WORK II	0	0	-	12		50	50	100	EEC

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Course Code	Course Title	Hours/Week			Credits	Prerequisites	Maximum marks			CAT
		L	T	P			CA	FE	Total	
PROFESSIONAL ELECTIVE THEORY COURSES (Four to be opted)										
20XWA1	MODELLING AND SIMULATION	3	2	0	4	20XW24	50	50	100	PE
20XWA2	BIG DATA AND MODERN DATABASES	3	2	0	4	20XW32, 20XW34	50	50	100	PE
20XWA3	SOFTWARE METRICS	3	2	0	4	20XW31, 20XW44	50	50	100	PE
20XWA4	PARALLEL AND DISTRIBUTED COMPUTING	3	2	0	4	20XW25, 20XW35, 20XW45	50	50	100	PE
20XWA5	DATA COMPRESSION	3	2	0	4	20XW23, 20XW31, 20XW33	50	50	100	PE
20XWA6	COMPUTER GRAPHICS AND VISUALIZATION	3	2	0	4	20XW21, 20XW23	50	50	100	PE
20XWA7	PRINCIPLES OF PROGRAMMING LANGUAGES	3	2	0	4		50	50	100	PE
20XWA8	AGILE SOFTWARE DEVELOPMENT	3	2	0	4	20XW44	50	50	100	PE
20XWA9	DEVOPS	3	2	0	4	20XW44	50	50	100	PE
20XWAA	CLOUD COMPUTING	3	2	0	4	20XW42, 20XW57, 20XW68	50	50	100	PE
20XWAB	SOCIAL NETWORK ANALYSIS	3	2	0	4	20XW53	50	50	100	PE
20XWAC	PREDICTIVE ANALYTICS	3	2	0	4	20XW31	50	50	100	PE
20XWAD	SECURITY IN COMPUTING	3	2	0	4	20XW42, 20XW45	50	50	100	PE
20XWAE	ADVANCED COMPUTER GRAPHICS	3	2	0	4	20XWA6	50	50	100	PE
20XWAF	BIG DATA ANALYTICS	3	2	0	4	20XW32	50	50	100	PE
20XWAG	NATURAL LANGUAGE PROCESSING	3	2	0	4	20XW53, 20XW62	50	50	100	PE
20XWAH	INTERNET OF THINGS	3	2	0	4	20XW35, 20XW42	50	50	100	PE
20XWAI	ADVANCED SYSTEMS PROGRAMMING	3	2	0	4	20XW15, 20XW45	50	50	100	PE
20XWAJ	STATISTICAL LEARNING	3	2	0	4	20XW21, 20XW53	50	50	100	PE
20XWAK	VIRTUAL & AUGMENTED REALITY	3	2	0	4	20XWA6	50	50	100	PE
20XWAL	APPLIED GRAPH THEORY	3	2	0	4	20XW22, 20XW31	50	50	100	PE
20XWAM	WIRELESS NETWORKS	3	2	0	4	20XW42	50	50	100	PE
20XWAN	NETWORK FORENSICS	3	2	0	4	20XW42, 20XW45	50	50	100	PE
20XWAO	RANDOMIZED ALGORITHMS	3	2	0	4	20XW31, 20XW34	50	50	100	PE
20XWAP	REINFORCEMENT LEARNING	3	2	0	4	20XW53, 20XW62	50	50	100	PE
20XWAQ	COMPUTER FORENSICS	3	2	0	4	20XW42, 20XW45	50	50	100	PE

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Course Code	Course Title	Hours/Week			Credits	Prerequisites	Maximum marks			CAT
		L	T	P			CA	FE	Total	
OPEN ELECTIVE THEORY COURSES (Two to be opted)										
20XWO1	PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCE	3	2	0	4		50	50	100	OE
20XWO2	ENTREPRENEURSHIP	3	2	0	4		50	50	100	OE
20XWO3	ENVIRONMENTAL SCIENCE AND GREEN COMPUTING	3	2	0	4		50	50	100	OE
20XWO4	QUANTUM MECHANICS AND FUNDAMENTALS OF QUANTUM COMPUTATION	3	2	0	4		50	50	100	OE
20XWO5	COMPUTATIONAL FOUNDATIONS FOR ROBOTICS	3	2	0	4		50	50	100	OE
20XWO6	MATHEMATICAL MODELLING	3	2	0	4	20XW31	50	50	100	OE
20XWO7	COMPUTATIONAL FINANCE	3	2	0	4	20XW11, 20XW31	50	50	100	OE

Labeling and Grouping of Courses

HUMANITIES AND SOCIAL SCIENCES (HS)			
S.No.	Course Code	Course Title	L:T:P:C
1	20XW12	ENGLISH FOR PROFESSIONAL SKILLS	3:0:0:3

BASIC SCIENCES (BS)			
S.No.	Course Code	Course Title	L:T:P:C
1	20XW11	CALCULUS AND ITS APPLICATIONS	3:2:0:4
2	20XW13	APPLIED PHYSICS	4:0:0:4
3	20XW14	ANALOG AND DIGITAL ELECTRONICS	4:0:0:4
4	20XW18	APPLIED PHYSICS AND DIGITAL ELECTRONICS LAB	0:0:4:2
5	20XW21	LINEAR ALGEBRA	3:2:0:4
6	20XW22	DISCRETE STRUCTURES	3:2:0:4
7	20XW31	PROBABILITY AND STATISTICS	3:2:0:4
8	20XW33	TRANSFORM TECHNIQUES	3:2:0:4
9	20XW41	ACCOUNTING AND FINANCIAL MANAGEMENT	4:0:0:4
10	20XW43	OPERATIONS RESEARCH	4:0:0:4
11	20XW47	MATHEMATICAL COMPUTING LAB (WITH R)	0:0:4:2
12	20XW54	THEORY OF COMPUTING	3:2:0:4

ENGINEERING SCIENCES (ES)			
S.No.	Course Code	Course Title	L:T:P:C
1	20XW16	ENGINEERING GRAPHICS AND GEOMETRIC MODELING	0:0:4:2

PROFESSIONAL CORE (PC)			
S.No.	Course Code	Course Title	L:T:P:C
1	20XW15	C PROGRAMMING	4:0:0:4
2	20XW17	C PROGRAMMING LAB	0:0:4:2
3	20XW23	DATA STRUCTURES AND ALGORITHMS	3:0:0:3
4	20XW24	OBJECT ORIENTED PROGRAMMING	3:0:0:3
5	20XW25	COMPUTER ORGANIZATION	3:0:0:3
6	20XW26	DATA STRUCTURES AND ALGORITHMS LAB	0:0:4:2
7	20XW27	OBJECT COMPUTING LAB	0:0:4:2
8	20XW28	PYTHON PROGRAMMING LAB	0:0:4:2
9	20XW32	DATA BASE MANAGEMENT SYSTEM	3:0:0:3
10	20XW34	DESIGN AND ANALYSIS OF ALGORITHMS	3:0:0:3
11	20XW35	MICROPROCESSOR AND EMBEDDED SYSTEMS	3:0:0:3
12	20XW36	DESIGN AND ANALYSIS OF ALGORITHMS LAB	0:0:4:2
13	20XW37	EMBEDDED SYSTEMS LAB	0:0:4:2
14	20XW38	RDBMS LAB	0:0:4:2
15	20XW42	COMPUTER NETWORKS AND TCP/IP	3:0:0:3
16	20XW44	SOFTWARE ENGINEERING TECHNIQUES	3:2:0:4
17	20XW45	OPERATING SYSTEMS	4:0:0:4
18	20XW46	COMPUTER NETWORKS AND TCP/IP LAB	0:0:4:2
19	20XW48	WEB DESIGNING LAB	0:0:4:2
20	20XW51	UNIX ARCHITECTURE AND PROGRAMMING	3:0:0:3
21	20XW52	JAVA PROGRAMMING	3:0:0:3
22	20XW53	MACHINE LEARNING	3:0:0:3
23	20XW56	UNIX SHELL AND SYSTEM PROGRAMMING LAB	0:0:4:2
24	20XW57	JAVA PROGRAMMING LAB	0:0:4:2
25	20XW58	MACHINE LEARNING LAB	0:0:4:2

26	20XW61	MOBILE COMPUTING	3:0:0:3
27	20XW62	ARTIFICIAL INTELLIGENCE	3:0:0:3
28	20XW63	SOFTWARE PATTERNS	3:2:0:4
29	20XW64	PRINCIPLES OF COMPILER DESIGN	3:2:0:4
30	20XW66	MOBILE COMPUTING LAB	0:0:4:2
31	20XW67	ARTIFICIAL INTELLIGENCE LAB	0:0:2:1
32	20XW68	DISTRIBUTED ENTERPRISE COMPUTING LAB	0:0:4:2
33	20XW81	INFORMATION RETRIEVAL AND WEB SEARCH	3:0:0:3
34	20XW82	DATA MINING	3:0:0:3
35	20XW83	SOFTWARE PROJECT MANAGEMENT	3:0:0:3
36	20XW86	INFORMATION RETRIEVAL AND WEB SEARCH LAB	0:0:4:2
37	20XW87	DATA MINING LAB	0:0:4:2
38	20XW88	CAPSTONE PROJECT LAB	0:0:4:2
39	20XW91	COMPUTER VISION AND IMAGE ANALYSIS	3:0:0:3
40	20XW92	SOFTWARE TESTING	3:0:0:3
41	20XW93	DEEP LEARNING	3:0:0:3
42	20XW96	DEEP LEARNING LAB	0:0:4:2
43	20XW97	COMPUTER VISION AND IMAGE ANALYSIS LAB	0:0:4:2
44	20XW98	FUNCTIONAL PROGRAMMING LAB	0:0:4:2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	L:T:P:C
1	20XWP1	PROJECT WORK I	0:0:0:12
2	20XW88	CAPSTONE PROJECT LAB	0:0:4:2
3	20XWP2	PROJECT WORK II	0:0:0:12

PROFESSIONAL ELECTIVES (PE)

S.No.	Course Code	Course Title	L:T:P:C	Preferred Semester
1	20XWA1	MODELLING AND SIMULATION	3:2:0:4	FROM V
2	20XWA2	BIG DATA AND MODERN DATABASES	3:2:0:4	FROM V
3	20XWA3	SOFTWARE METRICS	3:2:0:4	FROM V
4	20XWA4	PARALLEL AND DISTRIBUTED COMPUTING	3:2:0:4	FROM V
5	20XWA5	DATA COMPRESSION	3:2:0:4	FROM V
6	20XWA6	COMPUTER GRAPHICS AND VISUALIZATION	3:2:0:4	FROM V

7	20XWA7	PRINCIPLES OF PROGRAMMING LANGUAGES	3:2:0:4	FROM V
8	20XWA8	AGILE SOFTWARE DEVELOPMENT	3:2:0:4	FROM V
9	20XWA9	DEVOPS	3:2:0:4	FROM V
10	20XWAA	CLOUD COMPUTING	3:2:0:4	FROM V
11	20XWAB	SOCIAL NETWORK ANALYSIS	3:2:0:4	FROM V
12	20XWAC	PREDICTIVE ANALYTICS	3:2:0:4	FROM V
13	20XWAD	SECURITY IN COMPUTING	3:2:0:4	FROM V
14	20XWAE	ADVANCED COMPUTER GRAPHICS	3:2:0:4	FROM VI
15	20XWAF	BIG DATA ANALYTICS	3:2:0:4	FROM VI
16	20XWAG	NATURAL LANGUAGE PROCESSING	3:2:0:4	FROM VI
17	20XWAH	INTERNET OF THINGS	3:2:0:4	FROM VI
18	20XWAI	ADVANCED SYSTEMS PROGRAMMING	3:2:0:4	FROM VI
19	20XWAJ	STATISTICAL LEARNING	3:2:0:4	FROM VI
20	20XWAK	VIRTUAL & AUGMENTED REALITY	3:2:0:4	FROM VI
21	20XWAL	APPLIED GRAPH THEORY	3:2:0:4	FROM VI
22	20XWAM	WIRELESS NETWORKS	3:2:0:4	FROM VIII
23	20XWAN	NETWORK FORENSICS	3:2:0:4	FROM VIII
24	20XWAO	RANDOMIZED ALGORITHMS	3:2:0:4	FROM VIII
25	20XWAP	REINFORCEMENT LEARNING	3:2:0:4	FROM VIII
26	20XWAQ	COMPUTER FORENSICS	3:2:0:4	FROM VIII

OPEN ELECTIVES (OE)				
S.No.	Course Code	Course Title	L:T:P:C	Preferred Semester
1	20XWO1	PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCE	3:2:0:4	FROM VIII
2	20XWO2	ENTREPRENEURSHIP	3:2:0:4	FROM VIII
3	20XWO3	ENVIRONMENTAL SCIENCE AND GREEN COMPUTING	3:2:0:4	FROM VIII
4	20XWO4	QUANTUM MECHANICS AND FUNDAMENTALS OF QUANTUM COMPUTATION	3:2:0:4	FROM VIII
5	20XWO5	COMPUTATIONAL FOUNDATIONS FOR ROBOTICS	3:2:0:4	FROM VIII
6	20XWO6	MATHEMATICAL MODELLING	3 2 0 4	FROM VIII
7	20XWO7	COMPUTATIONAL FINANCE	3:2:0:4	FROM VIII