KURUKSHETRA UNIVERSITY KURUKSHETRA

[Established by the State Legislature Act XII of 1956]

('A+' Grade, NAAC Accredited)

AQAR-2020-21

1.2.2 : Scheme of Examination for the programmes in the Department/Institute of

Computer Science & Applications

Kurukshetra University, Kurukshetra

(Established by the State Legislature Act XII of 1956)
('A+' Grade, NAAC Accredited)

|| योगस्थ: कुरु कर्माणि ||

समबुद्धि व योग युक्त होकर कर्म करो

(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination and Syllabus of

Master of Computer Application (MCA)(CBCS) in Phased Manner

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

CBCS CURRICULUM (2020-21)

Program Name: Master of Computer Applications (MCA)(CBCS)

(For the Batches Admitted From 2020-2021)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

VISION

Pursue conducive advancement towards nurturing globally competent and ethically conscientious professionals and entrepreneurs in agile computing technologies and allied spheres for unceasing evolution of Nations IT affiliated commercial and research endeavours.

MISSION

Thrive to establish a strong foundation for technical competency in spheres concordant to software oriented design and development. Nurture skills and competency for administering expertise gained in computing discipline to a wide horizon of interdisciplinary application domains, thus supporting sustainable development of the society. Habituate the students to strive for technological innovations and successful endeavours ethically, supported by sustained learning continuance and problem solving proficiency that may promote nations welfare in terms of economic acceleration leading to the growth of society.

NAME OF THE PROGRAMME: MASTER OF COMPUTER APPLICATIONS
DURATION : TWO YEARS

PROGRAMME OUTCOMES (POs)	
PO1	Knowledge Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PO2	Research Aptitude Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis.
PO3	Communication Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO4	Problem Solving Capability of applying knowledge to solve scientific and other problems.
PO5	Individual and Team Work Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO6	Investigation of Problems Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO7	Modern Tool usage Ability to use and learn techniques, skills and modern tools for scientific practices.
PO8	Science and Society Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.
PO9	Life-Long Learning Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life.

PROGRAMME OUTCOMES (POs)	
PO10	Ethics Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work.
PO11	Project Management Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects.

PROGRAMME SPECIFIC OUTCOMES (PSOs)	
PSO1	Develop competency to administer knowledge and awareness in the computing discipline along with learning aptitude for lifelong endurance in professional realm.
PSO2	Develop proficiency to adapt to contemporary technologies, skills and models for computing practice.
PSO3	Acquire expertise to adopt skills realized during research, experimentation and trending technology cognizance to solve industrial problems.
PSO4	Promote professional competence to aspire careers in Commercial/ Government Sectors, Academics/ consultancy/ Research and Development for technological innovations, and collateral fields related to Computer Science and Information Technology.
PSO5	Foster analytical skills for programming and adept computer based designing of systems in the domains concordant to Algorithm Design, System Software, Web and Application Designing, Data Science & Analytics, Artificial Intelligence & Machine Intelligence, Graphics and Visualization, and Networking Services.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXAMINATIONS FOR
MASTER OF COMPUTER APPLICATIONS
CHOICE BASED CREDIT SYSTEM (CBCS)
W. E. F. ACADEMIC SESSION 2020-21 IN PHASED MANNER

Paper Code	Nomenclature of Paper	Credits	Workload Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
First Semester									
MCA-20-11	Programming in Java	4	4	3	75	30	25	100	40
MCA-20-12	Data Structures using C++	4	4	3	75	30	25	100	40
MCA-20-13	Operating Systems	4	4	3	75	30	25	100	40
MCA-20-14	Data Communication and Computer Networks	4	4	3	75	30	25	100	40
MCA-20-15	Object-Oriented Analysis and Design using UML	4	4	3	75	30	25	100	40
MCA-20-16	S/W Lab – I Based on MCA-20-11	2.5	5	3	100	40	-	100	40
MCA-20-17	S/W Lab – II Based on MCA-20-12	2.5	5	3	100	40	-	100	40
	Total	**25**	**30**		**575**	**230**	**125**	**700**	**280**
Second Semester									
MCA-20-21	Web Technologies	4	4	3	75	30	25	100	40
MCA-20-22	Linux and Shell Programming	4	4	3	75	30	25	100	40
MCA-20-23	Advanced Data Base Systems	4	4	3	75	30	25	100	40
MCA-20-24	Elective-I	4	4	3	75	30	25	100	40
MCA-20-25	Elective-II	4	4	3	75	30	25	100	40
MCA-20-26	S/W Lab – III Based on MCA-20-21 and MCA-20-23	2.5	5	3	100	40	-	100	40
MCA-20-27	S/W Lab – IV Based on MCA-20-22	2.5	5	3	100	40	-	100	40
*OE-20-28	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As Per University Guidelines	2	2	3	35	14	15	50	20
	Total	**27**	**32**		**610**	**244**	**140**	**750**	**300**
Elective – I									
MCA-20-24(i)	Principles of Programming Languages	4	4	3	75	30	25	100	40
MCA-20-24(ii)	High Performance Networks	4	4	3	75	30	25	100	40
MCA-20-24(iii)	Compiler Design	4	4	3	75	30	25	100	40
Elective – II									
MCA-20-25(i)	Theory of Computation	4	4	3	75	30	25	100	40
MCA-20-25(ii)	Design and Analysis of Algorithms	4	4	3	75	30	25	100	40
MCA-20-25(iii)	Security in Computing	4	4	3	75	30	25	100	40
Third Semester									
MCA-20-31	Computer Architecture and Parallel Processing	4	4	3	75	30	25	100	40

Paper Code	Nomenclature of Paper	Credits	Workload Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
MCA-20-32	Data Mining and Integration using R	4	4	3	75	30	25	100	40
MCA-20-33	Artificial Intelligence	4	4	3	75	30	25	100	40
MCA-20-34	Elective-III	4	4	3	75	30	25	100	40
MCA-20-35	Elective-IV	4	4	3	75	30	25	100	40
MCA-20-36	S/W Lab – V Based on MCA-20-32	2.5	5	3	100	40	-	100	40
MCA-20-37	S/W Lab –VI Based on MCA-20-35	2.5	5	3	100	40	-	100	40
MCA-20-38	Summer Training / Internship (Industry Based)	8	-	Viva Voce	150	60	50	200	80
*OE-20-39	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As Per University Guidelines	2	2	3	35	14	15	50	20
	Total	**35**	**32**		**760**	**304**	**190**	**950**	**380**
	Elective – III								
MCA-20-34(i)	Cloud Computing and IoT	4	4	3	75	30	25	100	40
MCA-20-34(ii)	Cyber Security	4	4	3	75	30	25	100	40
MCA-20-34(iii)	Digital Marketing	4	4	3	75	30	25	100	40
	Elective – IV								
MCA-20-35(i)	Advances in Java	4	4	3	75	30	25	100	40
MCA-20-35(ii)	Advanced Web Technologies	4	4	3	75	30	25	100	40
MCA-20-35(iii)	Programming with Kotlin	4	4	3	75	30	25	100	40
	Fourth Semester								
MCA-20-41	Big Data and Pattern Recognition	4	4	3	75	30	25	100	40
MCA-20-42	Computer Graphics and Animation	4	4	3	75	30	25	100	40
MCA-20-43	Mobile Application Development	4	4	3	75	30	25	100	40
MCA-20-44	Elective-V	4	4	3	75	30	25	100	40
MCA-20-45	Elective-VI	4	4	3	75	30	25	100	40
MCA-20-46	S/W Lab – VII Based on MCA-20-41 and MCA-20-42	2.5	5	3	100	40	-	100	40
MCA-20-47	Project Based on MCA-20-43	2.5	5	3	75	30	25	100	40
	Total	**25**	**30**		**550**	**220**	**150**	**700**	**280**
	Grand Total	**112**	**124**		**2495**	**998**	**605**	**3100**	**1240**
	Elective – V								
MCA-20-44(i)	Soft Computing	4	4	3	75	30	25	100	40
MCA-20-44(ii)	Machine Learning	4	4	3	75	30	25	100	40
MCA-20-44(iii)	Digital Image Processing	4	4	3	75	30	25	100	40
	Elective – VI								
MCA-20-45(i)	Optimization Techniques	4	4	3	75	30	25	100	40
MCA-20-45(ii)	Information Systems	4	4	3	75	30	25	100	40
MCA-20-45(iii)	Blockchain Technology	4	4	3	75	30	25	100	40

***Note 1:** In addition to the credits earned by compulsory and elective courses, every student has to earn 2 more credits by selecting an open elective/MOOC course during second and third semester.

****Note 2:** Summer Training / Internship will be held immediately after 2nd Semester Examination and will be having a minimum duration of 45 days and maximum duration of 60 days. Students have to submit the Summer Training / Internship Report latest by 30th August. Evaluation of the Report and Viva-Voce shall be held during 3rd Semester. The Evaluation and Viva-Voce shall be held by one External and one Internal examiner.

Note 3: The credits for the first year are 52(25+27) and for the second year are 60(35+25). Total credits of the course will be 60+52 = 112.

Note 4: For the purpose of computation of work-load the following mechanism shall be adopted:

- 1 Credit = 1 Theory period of one hour duration.
- 1 Credit = 1 Practical period of two hour duration.

Note 5: Evaluation procedure for internal assessment marks:

Two Mid Term Examinations should be conducted by the concerned teacher each of 10 marks. Five marks may be given by the concerned teacher on the basis of performance during the course (puzzles/ assignments/ interactions/ attendance etc.).

Note 6: Size of groups in all practical courses should not be more than thirty students.

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Scheme of Examination and Syllabus of

Master of Science (M.Sc.) Computer Science (Software) (CBCS)
in Phased Manner

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

CBCS CURRICULUM (2020-21)

Program Name: Master of Science (M.Sc.) Computer Science (Software) (CBCS)

(For the Batches Admitted From 2020-2021)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

VISION

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MISSION

Thrive to establish a strong foundation for technical competency in spheres concordant to software oriented design and development. Nurture skills and competency for administering expertise gained in computing discipline to a wide horizon of interdisciplinary application domains, thus supporting sustainable development of the society. Habituate the students to strive for technological innovations and successful endeavours ethically, supported by sustained learning continuance and problem solving proficiency that may promote nations welfare in terms of economic acceleration leading to the growth of society.

NAME OF THE PROGRAMME: MASTER OF SCIENCE
(COMPUTER SCIENCE (SOFTWARE))
DURATION : TWO YEARS

PROGRAMME OUTCOMES (POs)	
PO1	Knowledge Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PO2	Research Aptitude Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis.
PO3	Communication Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO4	Problem Solving Capability of applying knowledge to solve scientific and other problems.
PO5	Individual and Team Work Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO6	Investigation of Problems Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO7	Modern Tool usage Ability to use and learn techniques, skills and modern tools for scientific practices.
PO8	Science and Society Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.

PROGRAMME OUTCOMES (POs)	
PO9	Life-Long Learning Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life.
PO10	Ethics Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work.
PO11	Project Management Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects.

PROGRAMME SPECIFIC OUTCOMES (PSOs)	
PSO1	Provide exposure to the hardware and software environment of computer systems along with a comprehensive strengthening of computational expertise in programming languages and open source platforms.
PSO2	Enhance competency in designing and modeling software based applications with enrichment of proficiency in software design skills.
PSO3	Strengthen technical skills and professional expertise in adopting contemporary trends and technological developments for the application of innovative approaches and propositions to real-world problem scenario.
PSO4	Inspire pursuance of skillful expertise for careers in Commercial/ Government Sectors, Academics/ Consultancy/ Research and Development for technological innovations, and collateral fields related to Computer Science and Information Technology.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXAMINATION FOR MASTER OF SCIENCE
(COMPUTER SCIENCE (SOFTWARE))
CHOICE BASED CREDIT SYSTEM (CBCS)
W. E. F. ACADEMIC SESSION 2020-21 IN PHASED MANNER

Paper Code	Nomenclature of Paper	Credits	Workload Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
First Semester									
MS-20-11	Web Engineering	4	4	3	75	30	25	100	40
MS-20-12	Advanced Database Systems	4	4	3	75	30	25	100	40
MS-20-13	Linux and Shell Programming	4	4	3	75	30	25	100	40
MS-20-14	Discrete Mathematical Structures	4	4	3	75	30	25	100	40
MS-20-15	S/W Lab – I Based on MS-20-11 and MS-20-12	2.5	5	3	100	40	-	100	40
MS-20-16	S/W Lab – II Based on MS-20-13	2.5	5	3	100	40	-	100	40
	Total	**21**	**26**		**500**	**200**	**100**	**600**	**240**
Second Semester									
MS-20-21	Data Structures and Algorithms	4	4	3	75	30	25	100	40
MS-20-22	Programming in Java	4	4	3	75	30	25	100	40
MS-20-23	Object Oriented Analysis and Design using UML	4	4	3	75	30	25	100	40
MS-20-24	Data Communication and Computer Networks	4	4	3	75	30	25	100	40
MS-20-25	S/W Lab – III Based on MS-20-21	2.5	5	3	100	40	-	100	40
MS-20-26	S/W Lab – IV Based on MS-20-22	2.5	5	3	100	40	-	100	40
*OE-20-27	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As Per University Guidelines	2	2	3	35	14	15	50	20
	Total	**23**	**28**		**535**	**214**	**115**	**650**	**260**
Third Semester									
MS-20-31	Data Mining and Analytics using R	4	4	3	75	30	25	100	40
MS-20-32	Computer Graphics and Animation	4	4	3	75	30	25	100	40
MS-20-33	Elective-I	4	4	3	75	30	25	100	40
MS-20-34	Elective-II	4	4	3	75	30	25	100	40
MS-20-35	S/W Lab – V Based on MS-20-31	2.5	5	3	100	40	-	100	40
MS-20-36	S/W Lab – VI Based on MS-20-32	2.5	5	3	100	40	-	100	40
**MS-20-37	Summer Training / Internship	8	-	Viva Voce	150	60	50	200	80

Paper Code	Nomenclature of Paper	Credits	Workload Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
*OE-20-38	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As Per University Guidelines	2	2	3	35	14	15	50	20
	Total	**31**	**28**		**685**	**274**	**165**	**850**	**340**
Elective – I									
MS-20-33(i)	Compiler Design	4	4	3	75	30	25	100	40
MS-20-33(ii)	Advanced Computer Architecture	4	4	3	75	30	25	100	40
MS-20-33(iii)	Principles of Programming Languages	4	4	3	75	30	25	100	40
Elective – II									
MS-20-34 (i)	Mobile Computing	4	4	3	75	30	25	100	40
MS-20-34 (ii)	Theory of Computation	4	4	3	75	30	25	100	40
MS-20-34(iii)	Artificial Intelligence	4	4	3	75	30	25	100	40
Fourth Semester									
MS-20-41	Mobile Application Development	4	4	3	75	30	25	100	40
MS-20-42	Machine Learning using Python	4	4	3	75	30	25	100	40
MS-20-43	Elective-III	4	4	3	75	30	25	100	40
MS-20-44	Elective-IV	4	4	3	75	30	25	100	40
MS-20-45	S/W Lab–VII Based on MS-20-41	2.5	5	3	100	40	-	100	40
MS-20-46	S/W Lab-VIII Based on MS-20-42	2.5	5	3	100	40	-	100	40
	Total	**21**	**26**		**500**	**200**	**100**	**600**	**240**
	Grand Total	**96**	**108**		**2220**	**888**	**480**	**2700**	**1080**
Elective – III									
MS-20-43 (i)	Cryptography and Network Security	4	4	3	75	30	25	100	40
MS-20-43 (ii)	Big Data and Pattern Recognition	4	4	3	75	30	25	100	40
MS-20-43(iii)	Cyber Security and Blockchain Technology	4	4	3	75	30	25	100	40
Elective – IV									
MS-20-44 (i)	Optimization Techniques	4	4	3	75	30	25	100	40
MS-20-44 (ii)	Soft Computing	4	4	3	75	30	25	100	40
MS-20-44(iii)	Cloud Computing and IoT	4	4	3	75	30	25	100	40

***Note 1:** In addition to the credits earned by compulsory and elective courses, every student has to earn 2 more credits by selecting an open elective/MOOC course during second and third semester.

****Note 2:** Summer Training / Internship will be held immediately after 2nd Semester Examination and will be having a minimum duration of 45 days and maximum duration of 60 days. Students have to submit the Summer Training / Internship Report latest by 30th August. Evaluation of the Report and Viva-Voce shall be held during 3rd Semester. The Evaluation and Viva-Voce shall be held by one External and one Internal examiner.

Note 3: The credits for the first year are 44(21+23) and for the second year are 52(31+21). Total credits of the course shall be 44+52 = 96.

Note 4: For the purpose of computation of work-load the following mechanism shall be adopted:

- 1 Credit = 1 Theory period of one hour duration.
- 1 Credit = 1 Practical period of two hour duration.

Note 5: Evaluation procedure for internal assessment marks:

Two Mid Term Examinations should be conducted by the concerned teacher each of 10 marks. Five marks may be given by the concerned teacher on the basis of performance during the course (puzzles/ assignments/ interactions/ attendance etc).

Note 6: Size of groups in all practical courses should not be more than thirty students.

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Master of Technology (M.Tech.) in Computer Science & Engineering(CSE) (CBCS) in Phased Manner

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

CBCS CURRICULUM (2020-21)

Program Name: Master of Technology (M.Tech.) in Computer Science & Engineering (CSE) (CBCS)

(For the Batches Admitted From 2020-2021)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

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Thrive to establish a strong foundation for technical competency in spheres concordant to software oriented design and development. Nurture skills and competency for administering expertise gained in computing discipline to a wide horizon of interdisciplinary application domains, thus supporting sustainable development of the society. Habituate the students to strive for technological innovations and successful endeavours ethically, supported by sustained learning continuance and problem solving proficiency that may promote nations welfare in terms of economic acceleration leading to the growth of society.

NAME OF THE PROGRAMME: MASTER OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
DURATION : TWO YEARS

PROGRAMME OUTCOMES (POs)	
PO1	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis
PO3	Ability to communicate effectively on general and Technical topics with the engineering community and with society at large
PO4	Capability of applying knowledge to solve Engineering and other problems
PO5	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO6	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO7	Ability to use and learn techniques, skills and modern tools for scientific and engineering practices
PO8	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional Engineering practices
PO9	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life

PROGRAMME OUTCOMES (POs)	
PO10	Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work
PO11	Ability to demonstrate knowledge and understanding of the engineering principles and apply these to manage projects

PROGRAMME SPECIFIC OUTCOMES (PSOs)	
PSO1	Supplement potential for pursuing advanced studies, engaging in research & technological development directed towards innovative activities, and nurturing entrepreneurial skills.
PSO2	Strengthen competency for innovating solutions to real-world problems by exercising data analysis skills and adopting contemporary technologies for demanding prospective applications.
PSO3	Inculcate the practice to administer Professional & Ethical virtues, along with Social and Environmental regulations.
PSO4	Stimulate the aptitude for problem analysis and programming skills for computer based system design and modeling in allied spheres related to Algorithmic, Computational, Architectural and Database environments, along with emerging technologies such as Machine Learning& Intelligent systems , Evolutionary Techniques and Optimization, Data Science & Analytics, Distributed and Wireless Communication in cognation with IoT and Cloud Computing , Web and Mobile application designing, and Real World Enhancement using Computer Vision & Augmented Reality.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXAMINATION FOR MASTER OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING) CHOICE BASED CREDIT SYSTEM (CBCS) W. E. F. ACADEMIC SESSION 2020-21 IN PHASED MANNER

Paper Code	Nomenclature of Paper	Credits	Work load Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
First Semester									
MT-CSE-20-11	Mathematical Foundations of Computer Science	4	4	3	75	30	25	100	40
MT-CSE-20-12	Advanced Data Structures	4	4	3	75	30	25	100	40
MT-CSE-20-13	Elective- I	4	4	3	75	30	25	100	40
MT-CSE-20-14	Elective- II	4	4	3	75	30	25	100	40
MT-CSE-20-15	Research Methodology and IPR	3	3	3	75	30	25	100	40
MT-CSE-20-16	S/W Lab–I Based on MT-CSE-20-12	2.5	5	3	100	40	-	100	40
MT-CSE-20-17	S/W Lab-II Based on MT-CSE-20-13	2.5	5	3	100	40	-	100	40
	Total	**24**	**29**		**575**	**230**	**125**	**700**	**280**
Elective – I									
MT-CSE-20-13(i)	Machine Learning using Python	4	4	3	75	30	25	100	40
MT-CSE-20-13(ii)	Data Science using Python	4	4	3	75	30	25	100	40
MT-CSE-20-13(iii)	Wireless Sensor Networks	4	4	3	75	30	25	100	40
MT-CSE-20-13(iv)	Advanced Database Systems	4	4	3	75	30	25	100	40
Elective – II									
MT-CSE-20-14(i)	Intelligent Systems	4	4	3	75	30	25	100	40
MT-CSE-20-14(ii)	Distributed Systems	4	4	3	75	30	25	100	40
MT-CSE-20-14(iii)	Computer Vision and Augmented Reality	4	4	3	75	30	25	100	40
MT-CSE-20-14(iv)	Advanced Computer Architecture	4	4	3	75	30	25	100	40
Second Semester									
MT-CSE-20-21	Advances in Algorithms	4	4	3	75	30	25	100	40
MT-CSE-20-22	Soft Computing	4	4	3	75	30	25	100	40
MT-CSE-20-23	Elective – III	4	4	3	75	30	25	100	40
MT-CSE-20-24	Elective – IV	4	4	3	75	30	25	100	40
MT-CSE-20-25	S/W Lab –III Based on MT-CSE-20-21	2.5	5	3	100	40	-	100	40
MT-CSE-20-26	S/W Lab –IV Based on MT-CSE-20-23	2.5	5	3	100	40	-	100	40
*OE-CSE-20-27	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As per University Guidelines	2	2	3	35	14	15	50	20
	Total	**23**	**28**		**535**	**214**	**115**	**650**	**260**
Elective – III									
MT-CSE-20-23(i)	Data Preparation and Analysis	4	4	3	75	30	25	100	40
MT-CSE-20-23(ii)	Optimization Techniques	4	4	3	75	30	25	100	40

Paper Code	Nomenclature of Paper	Credits	Work load Per Week (Hrs.)	Exam Time (Hrs.)	External Marks		Internal Marks	Total Marks	Pass Marks
					Max.	Pass			
MT-CSE-20-23(iii)	Advanced Wireless and Mobile Networks	4	4	3	75	30	25	100	40
MT-CSE-20-23(iv)	Networking and Administration in Linux / Unix	4	4	3	75	30	25	100	40
Elective – IV									
MT-CSE-20-24(i)	Mobile Applications and Services	4	4	3	75	30	25	100	40
MT-CSE-20-24(ii)	Advanced Web Technologies	4	4	3	75	30	25	100	40
MT-CSE-20-24(iii)	Object-Oriented Software Engineering	4	4	3	75	30	25	100	40
MT-CSE-20-24(iv)	Big Data and Pattern Recognition	4	4	3	75	30	25	100	40
Third Semester									
MT-CSE-20-31	Elective-V	4	4	3	75	30	25	100	40
MT-CSE-20-32	Dissertation-I / Industrial Project	10	20	-	200	80	50	250	100
*OE-CSE-20-33	Open Elective Based on MOOCs (The selected course should not be directly related with Computer Science) Or As Per University Guidelines	2	2	3	35	14	15	50	20
	Total	**16**	**26**		**310**	**124**	**90**	**400**	**160**
Elective – V									
MT-CSE-20-31(i)	Compiler for High Performance Computing	4	4	3	75	30	25	100	40
MT-CSE-20-31(ii)	Cloud Computing and IoT	4	4	3	75	30	25	100	40
MT-CSE-20-31(iii)	Information Retrieval System	4	4	3	75	30	25	100	40
MT-CSE-20-31(iv)	Digital Image Processing	4	4	3	75	30	25	100	40
Fourth Semester									
MT-CSE-20-41	Dissertation-II	16	32	-	300	120	100	400	160
	Total	**16**	**32**	**-**	**300**	**120**	**100**	**400**	**160**
	Grand Total	**79**	**115**	**-**	**1720**	**688**	**430**	**2150**	**860**

Note 1: Instructions for Examiners to award marks/grades for Dissertation – II :-

The marks shall be awarded on the basis of three aspects,
(i) Evaluation of Dissertation Report (ii) Viva-Voce and (iii) Publication/Presentation of Research Paper from the dissertation.

Part (i) and (ii) carries 75% of the total marks for both internal and external evaluation. Part (iii) carries 25% of the total marks for both internal and external evaluation.
Part (iii) marks shall be awarded using following criteria:

1. Marks 91% or above: Publication from Dissertation in SCI indexed journal.
2. Marks 81% to 90%: Publication from Dissertation in Scopus indexed or Web of Science Indexed journal.
3. Marks 71% to 80%: Publication from Dissertation in Proceedings of Conference which is Scopus indexed/IEEE/ACM/Elsevier indexed or Publication from Dissertation in UGC Care List journal.
4. Marks 61% to 70%: Presented paper in International Conference.
5. Marks 51% to 60%: Presented paper in National Conference.

***Note 2:** In addition to the credits earned by compulsory and elective courses, every student has to earn 2 more credits by selecting an open elective/MOOC course during second and third semester.

Note 3: The credits for the first year are 47(24+23) and for the second year are 32(16+16). Total credits of the course shall be 47+32=79.

Note 4: For the purpose of computation of work-load the following mechanism shall be adopted:

- 1 Credit = 1 Theory period of one hour duration.
- 1 Credit = 1 Practical period of two hour duration.

Note 5: Evaluation procedure for internal assessment marks:
Two Mid Term Examinations should be conducted by the concerned teacher each of 10 marks. Five marks may be given by the concerned teacher on the basis of performance during the course (puzzles/ assignments/ interactions/ attendance etc).

Note 6: Size of groups in all practical courses should not be more than thirty students.