



Guru Jambheshwar University, Moradabad

Faculty of Computer Science

Program Proposal Document

Master of Computer Science (M.Sc. Computer Science)

(NEP 2020 Compliant, Industry-Integrated Postgraduate Program)

1. Introduction

The **Master of Science (M.Sc.) in Computer Science** program at *Guru Jambheshwar University, Moradabad* is an **industry-integrated postgraduate course** aimed at developing advanced competencies in **programming, software engineering, database systems, computer networking, artificial intelligence, and emerging digital technologies**.

In today's digital era, computing technologies drive innovation, research, and industrial growth. The program bridges the gap between **theoretical knowledge and practical application** by combining academic rigor with **experiential learning** through laboratories, internships, and industry-based projects.

Structured in accordance with the **National Education Policy (NEP) 2020** and **UGC Guidelines for Postgraduate Programs (2022–23 onwards)**, the curriculum follows a **flexible, multidisciplinary, and outcome-based model** focused on **skill development, employability, research aptitude, and entrepreneurship**.

By integrating **hands-on training, technology-enabled pedagogy, and professional mentoring**, the program prepares students for dynamic roles in **Software Development, Data Analytics, Artificial Intelligence, Cyber Security, academia, and innovation-driven enterprises**. Graduates emerge as technically proficient, ethically responsible, and future-ready professionals capable of adapting to the evolving digital landscape.

2. Program Rationale

The industrial and commercial ecosystem of **Western Uttar Pradesh**, particularly the **Moradabad region**, is undergoing rapid digital transformation with the growth of **IT-enabled services, software development, and e-commerce enterprises**. This evolving landscape has created a growing demand for professionals who combine **strong theoretical foundations** with **practical expertise** in programming, database management, network security, and emerging technologies.

The **M.Sc. Computer Science** program at *Guru Jambheshwar University, Moradabad* has been developed to address this gap by integrating **industry-oriented learning** with academic excellence. The curriculum emphasizes **hands-on exposure, research-driven innovation, and employability**, ensuring that graduates are prepared for contemporary technological challenges.

To achieve these objectives, the program incorporates:-

- **Internship-integrated learning** for practical industry experience.
- **Case-based and experiential pedagogy** to build analytical problem-solving skills.
- **Industry consultancy and project-based learning** for professional readiness.
- **Exposure to ERP systems, analytical tools, and digital platforms** used in modern enterprises.
- **Continuous assessment and personalized mentoring** for holistic academic and professional growth.

3. Alignment with NEP 2020 Framework

NEP Guideline	Program Implementation
Multiple Entry and Exit	Exit after 1 year with PG Diploma (40 credits); re-entry permitted through ABC.
Credit Framework	80 credits over 4 semesters.
Academic Bank of Credits (ABC)	Full compliance with UGC (Establishment and Operation of ABC) Regulations, 2021.
Choice Based Credit System (CBCS)	Core, Elective, Open, and Skill Enhancement courses offered.
Experiential Learning	20–25% credits earned through internships, professional practice labs, and projects.
Interdisciplinary Exposure	Electives available from AI, IoT, Machine Learning and Data Science.
Skill Development	Embedded labs on advanced software, analytics, and Project development.
Digital Learning	One course via SWAYAM/NPTEL (2 credits).
Holistic and Continuous Evaluation	Continuous internal assessment (50%) and end-semester evaluation (50%).

4. Program Objectives

The *Master of Science (M.Sc.) in Computer Science* program is designed with the following key objectives:

1. **To impart advanced theoretical and practical knowledge** of computer science concepts, computational models, and emerging technologies.
2. **To develop proficiency in software design, development, and data analytics**, enabling students to solve complex real-world problems using modern programming environments.
3. **To foster innovation, research aptitude, and entrepreneurial spirit** by encouraging creative thinking, interdisciplinary learning, and exposure to industrial challenges.
4. **To cultivate professional ethics, communication, teamwork, and leadership skills**, preparing graduates for responsible roles in academia, research, and the global IT industry.
5. **To integrate technology-enabled and experiential learning** that strengthens employability, adaptability, and lifelong learning capabilities.

5. Program Outcomes (POs)

Upon successful completion of the program, graduates will be able to:

1. **Apply advanced computing knowledge** to design, analyze, and implement efficient algorithms, software systems, and intelligent solutions.
2. **Utilize analytical reasoning and computational techniques** to address real-world technological, scientific, and business challenges effectively.
3. **Conduct independent research** using modern computing tools, frameworks, and methodologies to contribute to scientific and technological advancements.
4. **Demonstrate professional integrity, ethical values, and effective communication** in technical documentation, teamwork, and leadership roles.
5. **Adapt to evolving technologies and multidisciplinary environments** through continuous learning and innovation-driven professional development.

6. Eligibility Criteria

- B.Sc. (Computer Science) / BCA / B.Sc. (IT) / B.Sc.(PCM)/ B.E. / B.Tech. (CSE/IT/ECE) with minimum 45% marks (40% for SC/ST).
 - Admissions through **University Admission Process** / CUET-PG (as applicable).
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7. Program Duration and Credit Structure

Award	Duration	Credits	Exit Option
M.Sc. Computer Science	2 Years (4 Semesters)	80	Final award
PG Diploma in Computer Science	1 Year (2 Semesters)	40	Exit after 2 Semesters

Each semester carries **20 credits**, structured as per the UGC's four-semester PG model.

8. Program Structure (Semester-wise Distribution)

Semester I (20 Credits)

Paper Code	Paper Title	Credits	L-T-P	Marks (Int/Ext)	Total
MCS-101	Fundamentals of Computers & Emerging Technologies	4	3-1-0	50/50	100
MCS-102	Problem Solving using C Language	4	3-1-0	50/50	100
MCS-103	Computer Organization & Architecture	4	3-1-0	50/50	100
MCS-104	Operating Systems	4	3-1-0	50/50	100
MCS-105	Practical/Lab based on Problem Solving using C Language	4	0-0-8	50/50	100

Semester II (20 Credits)

Paper Code	Paper Title	Credits	L-T-P	Marks (Int/Ext)	Total
MCS-201	Object Oriented Programming	4	3-1-0	50/50	100
MCS-202	Database Management Systems	4	3-1-0	50/50	100
MCS-203	Data Communication and Computer Networks	4	3-1-0	50/50	100
MCS-204	Practical/Lab based on Object Oriented Programming/DBMS	4	0-0-8	50/50	100
MCS-205	Summer Internship (6–8 weeks)	4	-	-	-

Exit with PG Diploma (40 credits)

Semester III (20 Credits)

Paper Code	Paper Title	Credits	L-T-P	Marks (Int/Ext)	Total
MCS-301	Software Engineering	4	3-1-0	50/50	100
MCS-302	Data Structures and Algorithms	4	3-1-0	50/50	100
MCS-303	Practical/Lab based on Data Structures and Algorithms	4	0-0-8	50/50	100
MCS-304	Industry Consultancy Project	4	-	-	-
MCS-305-EL	Internet Technologies and Web Development (Elective)	4	3-1-0	50/50	100
MCS-306-EL	Cyber Security and Cryptography (Elective)	4	3-1-0	50/50	100
MCS-307-EL	Cloud Computing and Virtualization (Elective)	4	3-1-0	50/50	100

Semester IV (20 Credits)

Paper Code	Paper Title	Credits	L-T-P	Marks (Int/Ext)	Total
MCS-401	Dissertation / Major Project	10	-	100/200	300
MCS-402	Seminar & Viva Voce	2	-	50/50	100
MCS-403	Artificial Intelligence and Machine Learning	4	3-1-0	50/50	100
MCS-404-EL	Internet of Things (IoT) (Elective)	4	3-1-0	50/50	100
MCS-405-EL	Blockchain Technology (Elective)	4	3-1-0	50/50	100
MCS-406-EL	Data Mining and Data Warehousing (Elective)	4	3-1-0	50/50	100
MCS-407	MOOC / NPTEL Online Course	-	-	-	-

9. Internship and Professional Practice

The *M.Sc. Computer Science* program emphasizes **experiential and industry-oriented learning** through a structured internship framework designed to enhance employability, technical competence, and professional ethics.

Students are encouraged to apply classroom knowledge to practical contexts through real-world exposure and collaborative industrial engagement.

Components:

- **Short-Term Internship (After Semester II – 6–8 Weeks, 4 Credits):**
Provides initial industry exposure through placement in IT firms, startups, or MSME organizations to gain applied skills in programming, system design, and professional communication.
- **Industry Consultancy Project (Semester III – 4 Credits):**
Involves collaborative work with industry or research partners on real-time projects under the joint supervision of an **industry mentor** and a **faculty guide** to develop analytical and project management skills.
- **Major Internship / Dissertation (Semester IV – 10 Credits):**
A capstone component requiring students to undertake a research-oriented or application-based project in specialized areas such as AI, data analytics, or cybersecurity, demonstrating innovation and independent learning.

Evaluation Framework:

Each internship is governed by a **Learning Agreement** signed by the student, faculty guide, and industry mentor, defining clear objectives and deliverables.

Evaluation Component	Weightage
Industry Mentor Assessment	40%
Faculty Supervisor Assessment	40%
Viva-Voce / Presentation	20%

This framework ensures **practical exposure, industry relevance, and holistic learning**, fulfilling the **NEP 2020 mandate** for experiential and outcome-based education.

10. Assessment and Evaluation

The *M.Sc. Computer Science* program follows a **comprehensive and outcome-based evaluation framework** that ensures continuous learning, conceptual understanding, and practical skill development.

Both internal and external assessments contribute to the final performance of the student as per UGC and university norms.

Component	Weightage / Description
Continuous Internal Assessment (CIA)	50% — Based on assignments, case studies, presentations, attendance, and laboratory performance.
End Semester Examination / Viva-Voce	50% — Conducted at the end of each semester to assess comprehensive understanding and application of knowledge.
Internship / Project Evaluation	As per <i>Joint Assessment Policy</i> (Industry Mentor + Faculty Supervisor + Viva Board).
Minimum Passing Grade	40% aggregate per course , with mandatory participation in all evaluation components.

11. Pedagogical Approach

The *M.Sc. Computer Science* program employs a **blended, experiential, and technology-enabled pedagogical framework** that emphasizes participative learning and professional readiness in alignment with NEP 2020.

Teaching Method / Approach	Description / Implementation Strategy
Experiential Learning	Emphasis on real-life applications through simulation exercises, mini-projects, industrial visits, and internships.
Case-Based and Problem-Oriented Learning	Use of case studies and problem-solving assignments to connect theory with real-world scenarios.
Industry-Integrated Teaching	Regular guest lectures, workshops, and mentoring sessions conducted by IT professionals and entrepreneurs.
Research-Linked Learning	Students engage in research projects, paper presentations, and technical writing activities to build analytical and academic skills.
ICT-Enabled Instruction	Integration of Learning Management Systems (LMS), SWAYAM/NPTEL courses, and virtual laboratories for flexible and blended learning.
Collaborative and Project-Based Learning	Group projects and inter-disciplinary assignments promote teamwork, leadership, and communication skills.
Skill Enhancement Workshops	Hands-on training in programming, AI tools, cloud technologies, and data analytics to strengthen employability.

12. Faculty and Infrastructure Requirements

The *M.Sc. Computer Science* program requires a robust academic and infrastructural ecosystem to ensure effective delivery, practical exposure, and research facilitation in accordance with UGC norms.

Category	Requirement / Specification
Faculty Qualification	Ph.D. or M.Tech. (Computer Science / Information Technology) with NET and relevant teaching, research, or industry experience.
Faculty–Student Ratio	1:15, as per UGC guidelines for postgraduate programs.
Supporting Staff	Qualified laboratory assistants, technical staff, and administrative personnel for lab and academic operations.
Laboratories	Advanced Computing Lab, Artificial Intelligence & Machine Learning Lab, Database and Networking Lab, and Cloud Computing Lab.
Library and e-Resources	Access to digital databases such as IEEE, Springer, ACM, ScienceDirect, and NPTEL/SWAYAM repositories.
Smart Classrooms	Equipped with LCD projectors, digital boards, and high-speed internet connectivity for ICT-enabled learning.
Research Facilities	Dedicated research workspace with software tools for simulation, data analysis, and algorithmic modeling.
IT Infrastructure	Licensed software, cloud-based applications, high-performance computing systems, and Wi-Fi-enabled campus.
Seminar and Conference Facilities	Modern seminar halls for guest lectures, technical talks, and academic presentations.
Industry Collaborations	MoUs with MSMEs, IT companies, and start-ups for internships, joint projects, and consultancy assignments.

13. Quality Assurance and Monitoring

To ensure continuous improvement and academic excellence, the *M.Sc. Computer Science* program follows a structured **quality assurance and monitoring framework** in alignment with UGC and NEP 2020 guidelines.

Periodic reviews, feedback, and data-driven evaluations are conducted under the supervision of the **Internal Quality Assurance Cell (IQAC)** and **Academic Council**.

Area / Parameter	Monitoring Mechanism / Strategy
Curriculum Review	Regular revision through Board of Studies (BoS) meetings with inputs from academia, industry, and alumni.
Teaching–Learning Evaluation	Continuous assessment of teaching effectiveness through feedback, peer observation, and digital attendance analysis.
Outcome-Based Education (OBE)	Mapping and evaluation of Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs) for measurable attainment.
Student Performance Monitoring	Periodic tracking of student progression through internal assessments, semester results, and remedial support.
Industry–Academia Collaboration	Regular industry interactions, internship audits, and evaluation of consultancy projects for practical exposure.
Research and Innovation Quality	Monitoring of student dissertations, publications, and participation in conferences or hackathons.
Faculty Development	Organization of FDPs, workshops, and seminars for continuous faculty up-skilling in emerging technologies.
Feedback and Improvement System	Collection and analysis of structured feedback from students, faculty, employers, and alumni for continuous enhancement.
IQAC and Academic Council Oversight	Semester-wise review of quality parameters and policy implementation to ensure academic integrity and excellence.

14. SWOT Analysis

A comprehensive SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis has been conducted to evaluate the *M.Sc. Computer Science* program's current positioning, growth potential, and areas for continuous improvement.

This analysis ensures alignment with institutional goals, industry expectations, and NEP 2020 objectives.

Strengths	Weaknesses	Opportunities	Threats
NEP 2020–compliant, flexible, and outcome-based curriculum.	Limited faculty specialization in niche areas such as Data Science and Cyber-security.	Potential collaborations with MSMEs, start-ups, and IT firms for internships and research.	Rapid technological changes requiring frequent curriculum updates.
Strong focus on experiential and project-based learning.	Need for additional research infrastructure and computational resources.	Expansion of consultancy and incubation activities under the University Innovation Cell.	Increasing competition from national and global universities offering similar programs.
Integration of industry mentorship and practical exposure through internships.	Limited international collaboration at the initial stage.	Collaboration with NPTEL/SWAYAM and IIT institutions for MOOCs and FDPs.	Talent migration of skilled graduates to metropolitan regions.
Highly employable graduates with technical and ethical competence.	Dependence on external organizations for live project resources.	Opportunities for interdisciplinary projects with Physics, Commerce, and Management streams.	Challenges in sustaining continuous faculty up-skilling and technology adoption.

15. Approval and Implementation

The *M.Sc. Computer Science* program shall be implemented in accordance with the academic policies of **Guru Jambheshwar University, Moradabad**, and governed by the rules framed under **UGC Guidelines for NEP 2020–Compliant Postgraduate Programs**. All approvals and monitoring will be conducted through the statutory bodies of the University, ensuring transparency, accountability, and academic excellence.

Category	Details / Description
Effective Academic Session	2025–26 onwards.
Program Offered By	Faculty of Computer Science, Guru Jambheshwar University, Moradabad.
Mode of Delivery	Regular / Full-Time Program.
Program Duration	2 Years (4 Semesters).
Total Credits	80 (20 credits per semester as per UGC PG model).
Medium of Instruction	English.
Admission Procedure	Through University Admission Process / CUET-PG (as applicable).
Intake Capacity	30 Students (modifiable as per University norms).
Credit Registration	Integrated with Academic Bank of Credits (ABC) for credit accumulation and mobility.
Curriculum Review and Approval	Periodic review through Board of Studies (BoS) and Academic Council for compliance and up-gradation.
Examination and Evaluation	Conducted under University Examination Cell as per OBE (Outcome-Based Education) and NEP 2020 guidelines.
Certification and Exit Option	PG Diploma exit after 1 Year (40 Credits); Final M.Sc. Degree after completion of 2 Years (80 Credits).

16. Annexures (For Submission)

The following annexures form an integral part of the *M.Sc. Computer Science* program proposal and provide detailed supporting information for academic approval, implementation, and monitoring.

Each annexure ensures transparency, outcome measurement, and alignment with NEP 2020 guidelines for postgraduate education.

Annexure Title	Description / Contents
Annexure – I: Detailed Course Outcomes (COs) and CO–PO Mapping	Comprehensive mapping of Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs) for each course offered across all four semesters.
Annexure – II: Internship and Project Evaluation Policy	Structured guidelines for internship duration, learning agreements, evaluation rubrics, and joint assessment (industry + faculty).
Annexure – III: Industry Collaboration and MoU Samples	Copies or templates of Memoranda of Understanding (MoUs) with MSMEs, software firms, and startups for internships, consultancy, and collaborative projects.
Annexure – IV: Faculty Qualification and Experience Sheet	Detailed list of teaching faculty members with their qualifications, designations, research publications, and specialization areas.
Annexure – V: Model Time Table and Evaluation Scheme	Illustrative timetable format, credit distribution, and evaluation structure for theory, practical, and project components.
Annexure – VI: Infrastructure and Laboratory Inventory	Specifications of laboratory equipment, computing resources, software tools, and digital infrastructure available for program delivery.
Annexure – VII: Quality Assurance and Feedback Formats	Standardized templates for student feedback, course evaluation, and IQAC monitoring of academic processes.

Submitted for consideration and approval by the Board of Studies and Academic Council.

(As per Clause of Guru Jambheshwar University Statutes on Program Approval.)



Prepared by:
Dr. Sunil Kumar Pawar

Faculty of Computer Science
Guru Jambheshwar University, Moradabad

Coordinator: _____

Date: _____

Approved by:

Dean (Academic Affairs) _____

Vice Chancellor _____

MASTER OF COMPUTER SCIENCE (FIRST YEAR)

SEMESTER-I (SYLLABUS)

MCS-101:FUNDAMENTAL OF COMPUTERS & EMERGING TECHNOLOGIES		
Course Outcome(CO)		Bloom's Knowledge Level(KL)
At the end of course, the student will be able to		
CO 1	Demonstrate the knowledge of the basic structure, components, features and generations of computers.	K ₁ ,K ₂
CO 2	Describe the concept of computer languages, language translators and construct algorithms to solve problems using programming concepts.	K ₂ ,K ₃
CO 3	Compare and contrast features, functioning & types of operating system and Computer networks.	K ₄
CO 4	Demonstrate architecture, functioning & services of the Internet and basics of multimedia.	K ₂
CO 5	Illustrate the emerging trends and technologies in the field of Information Technology.	K ₁ ,K ₂
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Introduction to Computer: Definition, Computer Hardware & Computer Software Components: Hardware – Introduction, Input devices, Output devices, Central Processing Unit, Memory-Primary and Secondary. Software- Introduction, Types – System and Application. Computer Languages: Introduction, Concept of Compiler, Interpreter & Assembler Problem solving concept: Algorithms – Introduction, Definition, Characteristics, Limitations, Conditions in pseudo-code, Loops in pseudo code.	08
II	Operating system: Definition, Functions, Types, Classification, Elements of command based and GUI based operating system. Computer Network: Overview, Types (LAN, WAN and MAN), Data communication, topologies.	08
III	Internet: Overview, Architecture, Functioning, Basic services like WWW, FTP, Telnet, Gopher etc., Search engines, E-mail, Web Browsers. Internet of Things (IoT): Definition, Sensors, their types and features, Smart Cities, Industrial Internet of Things.	08
IV	Block chain: Introduction, overview, features, limitations and application areas, fundamentals of Block Chain. Crypto Currencies: Introduction, Applications and use cases Cloud Computing: nature and benefits, AWS, Google, Microsoft & IBM Services	08
V	Emerging Technologies: Introduction, overview, features, limitations and application areas of Augmented Reality, Virtual Reality, Grid computing, Green computing, Big data analytics, Quantum Computing and Brain Computer Interface	08

Suggested Readings:

1. Rajaraman V., "Fundamentals of Computers", Prentice-Hall of India.
2. Norton P., "Introduction to Computers", McGraw Hill Education.
3. Goel A., "Computer Fundamentals", Pearson.
4. Balagurusamy E., "Fundamentals of Computers", McGraw Hill.
5. Thareja R., "Fundamentals of Computers", Oxford University Press.
6. Bindra J., "The Tech Whisperer-on Digital Transformation and the Technologies that Enable it", Penguin Books.

MCS-102: PROBLEM SOLVING USING C		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to		
CO1	Describe the functional components and fundamental concepts of a Digital computer system including number systems.	K ₁ , K ₂
CO2	Construct flow chart and write algorithms for solving basic problems.	K ₂ , K ₃
CO3	Write 'C' programs that incorporate use of variables, operators and expressions along with data types.	K ₂ , K ₃
CO4	Write simple programs using the basic elements like control statements, functions, arrays and strings.	K ₂ , K ₃
CO5	Write advanced programs using the concepts of pointers, structures, Unions and enumerated data types.	K ₂ , K ₃
CO6	Apply pre-processor directives and basic file handling and graphics Operations in advanced programming.	K ₂ , K ₃
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Basics of programming: Approaches to problem solving, Use of high-level programming language for systematic development of programs, Concept of algorithm and flowchart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input/ Output, Operators and expressions.	08
II	Conditional Program Execution: if, if-else, and nested if-else statements, Switch statements, Restrictions on switch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration: for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. Functions: Introduction, Types, Declaration of a Function, Function calls, Defining functions, Function Prototypes, Passing arguments to a function Return values and their types, Writing multifunction program, Calling function by value, Recursive functions.	08
III	Arrays: Array notation and representation, Declaring one-dimensional array, Initializing arrays, Accessing array elements, Manipulating array elements, Arrays of unknown or varying size, Two-dimensional arrays, Multidimensional arrays. Pointers: Introduction, Characteristics, * and & operators, Pointer type declaration and assignment, Pointer arithmetic, Call by reference, Passing pointers to functions, array of pointers, Pointers to functions, Pointer to pointer, Array of pointers. Strings: Introduction, Initializing strings, Accessing string elements, Array of strings, Passing strings to functions, String functions.	08

IV	Structure: Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure, Pointers to structure. Union: Introduction, Declaring union, Usage of unions, Operations on union. Enumerated data types Storage classes: Introduction, Types- automatic, register, static and external.	08
V	Dynamic Memory Allocation: Introduction, Library functions – malloc, calloc, realloc and free. File Handling: Basics, File types, File operations, File pointer, File opening modes, File handling functions, File handling through command line argument, Record I/O in files. Graphics: Introduction, Constant, Data types and global variables used in graphics, Library functions used in drawing, Drawing and filling images, GUI interaction within the program.	08
Suggested Readings: 1. Kanetkar Y., “Let Us C”,BPB Publications. 2. Hanly J. R. and Koffman E.B., “Problem Solving and Program Designing C”, Pearson Education. 3. Schildt H., “C-The Complete Reference”, Tata McGraw-Hill. 4. Goyal K.K. and Pandey H.M., “Trouble Free C”, University Science Press 5. Gottfried B., “Schaum’s Outlines-Programming in C”, Tata McGraw-Hill Publications. 6. Kochan S.G., “Programming in C”, Addison-Wesley. 7. Dey P. and Ghosh M., “Computer Fundamentals and Programming in C”, Oxford University Press. 8. Goyal K.K., Sharma M.K. and Thapliyal M.P. “Concept of Computer and C Programming”, University Science Press.		

MCS-103:COMPUTER ORGANIZATION & ARCHITECTURE		
Course Outcome(CO)		Bloom's Knowledge Level(KL)
At the end of course, the student will be able to		
CO 1	Describe functional units of digital system and explain how arithmetic and logical operations are performed by computers	K ₂ ,K ₃
CO 2	Describe the operations of control unit and write sequence of instructions for carrying out simple operation using various addressing modes.	K ₂ ,K ₄
CO 3	Design various types of memory and its organization.	K ₃
CO 4	Describe the various modes in which IO devices communicate with CPU And memory.	K ₂ ,K ₃
CO 5	List the criteria for classification of parallel computer and describe various architectural schemes.	K ₁ ,K ₂
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization: general registers organization, stack organization and addressing modes.	08
II	Arithmetic and logic unit: Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers.	08
III	Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc.), micro-operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro-program sequencing, concept of horizontal and vertical Micro-programming.	08
IV	Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and Optical disks Virtual memory: concept implementation.	08
V	Input/Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, Standard communication interfaces.	08

Suggested Readings:

1. Mano M.M., "Computer System Architecture", PHI.
2. Hamacher C., Vranesic Z. and Zaky S., "Computer Organization", McGraw-Hill.
3. Hayes J.P., "Computer Architecture and Organization", Tata McGraw-Hill.
4. Stallings W., "Computer Organization and Architecture-Designing for Performance", Pearson Education.
5. Parahami B., "Computer Architecture", Oxford University Press.
6. Patterson D.A. and Hennessy J.L., "Computer Architecture-A Quantitative Approach", Elsevier Pub.
7. Tannenbaum A.S., "Structured Computer Organization", PHI.

MCS-104:OPERATING SYSTEMS		
Course Outcome(CO)		Bloom's Knowledge Level(KL)
At the end of course, the student will be able to		
CO1	Explain main components, services, types and structure of Operating Systems.	K ₂
CO2	Apply the various algorithms and techniques to handle the various concurrency control issues.	K ₃
CO3	Compare and apply various CPU scheduling algorithms for process execution.	K ₂
CO4	Identify occurrence of deadlock and describe ways to handle it.	K ₃
CO5	Explain and apply various memory, I/O and disk management techniques.	K ₅
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Introduction: Operating System Structure- Layered structure, System Components, Operating system functions, Classification of Operating systems- Batch, Interactive, Time-sharing, Real-Time System, Multiprocessor Systems, Multiuser Systems, Multi process Systems, Multi threaded Systems, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	08
II	Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation, Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem, Inter Process Communication Models and Schemes, Process generation.	08
III	CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	08
IV	Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.	08
V	I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File System protection and security.	08

Suggested Readings:

1. Silberschatz A., Galvin P.B. and Gagne G., "Operating Systems Concepts", Wiley Pub.
2. Halder S. and Arvind A.A "Operating Systems", Pearson Education.
3. Dietel H.M, "An Introduction to Operating System", Pearson Education.
4. Stallings W., "Operating Systems: Internals and Design Principles", Pearson Education.
5. Harris J.A., "Operating Systems (Schaum's Outlines)", Mc-Graw Hill Education.

MCS-105: PROBLEM SOLVING USING C LAB		
Course Outcome(CO)		Bloom's Knowledge Level(KL)
At the end of course, the student will be able to		
CO1	Write, compile, debug and execute programs in a C programming environment.	K ₃
CO2	Write programs that incorporate use of variables, operators and expressions along with data types.	K ₃
CO3	Write programs for solving problems involving use of decision control structures and loops.	K ₃
CO4	Write programs that involve the use of arrays, structures and user-defined functions.	K ₃
CO5	Write programs using graphics and file handling operations.	K ₃
1. Program to implement conditional statements in C language. 2. Program to implements witch-case statement in C language 3. Program to implement looping constructs in C language. 4. Program to perform basic input-output operations in C language. 5. Program to implement user defined functions in C language. 6. Program to implement recursive functions in C language. 7. Program to implement one-dimensional arrays in C language. 8. Program to implement two-dimensional arrays in C language. 9. Program to perform various operations on two-dimensional arrays in C language. 10. Program to implement multi-dimensional arrays in C language. 11. Program to implement string manipulation functions in C language. 12. Program to implement structure in C language. 13. Program to implement union in C language. 14. Program to perform file handling operations in C language. 15. Program to perform graphical operations in C language.		