GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications
Level: Post Graduate
Course / Subject Code: MC04094011
Course / Subject Name: Research Work(Phase-2)/Major Project

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	Core Course (CC)

Prerequisite:	• Successful completion of Research Work (Phase – 1 / Minor Project) • Proficiency in chosen domain tools, technologies, or research methodology • Basic project management and documentation skills
Rationale:	Phase – 2 enables students to apply and extend the research or project plan developed in Phase – 1, or to take up a new project/research problem with industry or academia. The emphasis is on implementation, experimentation, validation, analysis, and dissemination. It strengthens professional readiness by integrating academic research and industrial practice, culminating in a final deliverable that demonstrates mastery of the MCA program outcomes. **Pedagogy:** • Experiential and Outcome-Based Learning • Mentor-guided Independent Work • Industry Internship / Field Attachment (if applicable) • Regular Progress Presentations and Demonstrations • Use of Version Control and Collaboration Tools (GitHub, Notion, JIRA, etc.) • Peer Review and Reflective Reporting

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply research or development methodologies to implement and test a complete solution / model / system	AP
02	Integrate analytical, programming, and design skills to develop efficient, scalable, and ethical solutions	CR
03	Conduct experiments, data collection, validation, and performance evaluation	AN
04	Document and present project outcomes in the format of a dissertation or technical paper	EV
05	Demonstrate teamwork, professional ethics, project management, and effective communication	AP
06	Exhibit ability to adapt to industry environment and contribute meaningfully to organizational goals (for industrial projects)	EV

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
0	0	40	20	0	0	200	300	500

Guidelines for Student Work:

1. **Project Selection:**
   - Individual or group (max 2-3 students)
   - Should be from chosen domain/elective
   - Must be feasible and implementable within time and resource constraints
2. **Proposal Components:**
   - Title, Abstract, Introduction
   - Problem Statement, Objectives, and Scope
   - Literature Review / Market Survey
   - Proposed Solution/Methodology
   - Tools/Technologies/Hardware
   - Tentative Timeline and Work Plan
   - Expected Outcomes
   - Ethical, Legal, and Environmental Considerations
3. **Milestones:**

Week	Phase	Activity	Deliverables
1–2	Orientation & Planning	Review of Phase 1 / New Project Proposal	Refined proposal, Gantt chart, mentor approval
3–5	Design & Setup	System / Model architecture design; Dataset / environment setup	Design document, progress review I
6–9	Implementation	Coding / experimentation / integration	Prototype, report draft, progress review II
10–12	Testing & Validation	Data analysis, performance metrics, results interpretation	Test reports, validation outcomes
13–14	Documentation & Publication	Thesis writing, paper preparation, poster	Draft dissertation, publication submission (optional)
15	Final Presentation	Viva voce & demonstration	Final report and source code submission

Continuous Progress Monitoring Plan:

- Weekly Mentor Meetings: progress review, logbook maintenance
- Biweekly Progress Reports: submitted via departmental system or repository
- Mid-Term Evaluation: demonstration + partial report
- Industry Mentor Feedback: mandatory for industrial projects
- Project Diary / Logbook: signed weekly by mentor
- Online Tracking: GitHub commit log / JIRA task updates

Assessment Method:

Component	Weightage	Description
Project Proposal & Plan	10%	Relevance, clarity, feasibility
Progress Review I	10%	Implementation progress, planning
Progress Review II	15%	Testing, validation, problem-solving
Final Report / Dissertation	25%	Completeness, quality, references, formatting
Demonstration / Prototype	20%	Functionality, innovation, performance
Final Viva & Presentation	20%	Communication, justification, depth of understanding

Evaluation Rubric:

Criteria	Excellent (8–10)	Good (6–7)	Average (4–5)	Poor (<4)
Problem Definition	Clear, researchable, impactful	Clear but narrow	Generic	Undefined
Methodology / Design	Innovative, justified, well-documented	Appropriate but limited	Standard, minimal innovation	Incomplete / inconsistent
Implementation	Fully functional, optimized	Working with minor issues	Partial functionality	Incomplete / non-working
Validation & Results	Strong empirical results, benchmarks	Partial results, adequate testing	Limited or inconsistent validation	No meaningful results
Documentation	Professional report, excellent presentation	Organized and clear	Basic clarity, minor errors	Poorly structured
Teamwork & Management	Excellent coordination & use of tools	Good collaboration	Some imbalance	Disorganized, minimal teamwork
Ethics & Sustainability	Strong ethical awareness & societal impact	Mentioned but not deep	Limited awareness	Absent or violated

Guidelines for Industry-Based Projects

- Duration: minimum 12 weeks of field engagement
- Must have an industry mentor and academic guide
- NDA or confidentiality compliance if required
- Industry evaluation form (feedback + grading) contributes 25% of internal marks
- Deliverables: project report, presentation, certificate of completion from host organization

Deliverables Checklist

- Synopsis & Plan (Approved)
- Logbook with weekly mentor signature
- Mid-term report and presentation
- Final report / dissertation
- Source code / model / dataset / documentation
- Poster and presentation slides

References/Suggested Learning Resources:

(a) Books:

1. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, Sage Publications
2. C.R. Kothari, Research Methodology: Methods and Techniques, New Age International
3. Ian Sommerville, Software Engineering, Pearson
4. Pressman & Maxim, Software Engineering: A Practitioner's Approach, McGraw-Hill
5. Field-specific journal papers, technical blogs, white papers

(b) Tools & Platforms:

- Reference Managers: Mendeley, Zotero
- Documentation: LaTeX, MS Word
- Collaboration: GitHub, Overleaf, Google Drive
- Project Management: Trello, JIRA, Notion
- Survey: Google Forms, SurveyMonkey
- Data Analysis: Python, R, MATLAB
- Testing/Validation: JMeter, Selenium, TensorBoard (as applicable)

Expected Outcomes

- Complete working model, research paper, or industry-grade solution
- Demonstrated ability to manage an end-to-end software or research project
- Readiness for industrial employment or doctoral research
- Contribution to institute-level publication or innovation repository

CO- PO Mapping:

Semester 4	**Course Name: Research Work(Phase-2)/Major Project**							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	2	2	2
CO2	3	3	3	3	3	2	2	3
CO3	2	3	3	3	2	3	2	2
CO4	3	2	3	2	3	3	2	3
CO5	2	2	3	3	3	3	3	3
CO6	2	2	2	3	3	3	3	3

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.

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