Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Program Outcomes -Competencies – Performance Indicators
For
MCA Program

PO1: Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for problem solving technique to formulate solution for Information System.

Competency	Indicators
1.1 Demonstrate competence in mathematical modelling	1.1.1 Apply mathematical techniques such as Probability, statistics, optimization techniques to solve problems
	1.1.2 Apply advanced mathematical techniques to model and solve computational problems
1.2 Demonstrate competence in computing fundamentals	1.2.1 Apply computational fundamental concepts to solve Information system problems
1.3 Demonstrate competence in specialized domain knowledge to the program	1.3.1 Apply domain knowledge concepts to solve computer science/IT problems.

PO2: : Problem Analysis: Conceptualize knowledge and background to be able to analyze a problem and identify and define the computing requirements for its solution

Competency	Indicators
2.1 Demonstrate an ability to identify and formulate complex Information system problem	2.1.1 Evaluate problem statements and identifies objectives 2.1.2 Identifies processes/modules/algorithms of a computer based system and parameters to solve a problem 2.1.3 Identifies mathematical algorithmic knowledge that applies to a given problem
2.2 Demonstrate an ability to formulate a solution plan and methodology for an information system problem	2.2.1 Reframe the computer based system into interconnected subsystems 2.2.2 Identifies functionalities and computing resources 2.2.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions 2.2.4 Compare and contrast alternative solution/methods to select the best methods 2.2.5 Compare and contrast alternative solution processes to select the best process.

2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system or process that is appropriate in terms of applicability and required accuracy. 2.3.2 Identify assumptions (mathematical and logical) necessary to allow modeling of a system at the level of accuracy required.
2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Apply computational knowledge to solve mathematical models 2.4.2 Analyze and interpret the results using contemporary tools. 2.4.3 Identify sources of error in the solution process, and limitations of the solution 2.4.4 Arrive at conclusions with respect to the objectives.

PO3: Design / Development of Solutions: Design a new system to meet certain specification.

Competency	**Indicators**
3.1 Demonstrate an ability to define a complex / open- ended problem in engineering terms	3.1.1 Able to define a precise problem statement with objectives and scope
	3.1.2 Able to identify and document system requirements from stake holders.
	3.1.3 Ability to review state of the art literature to synthesize system requirements
	3.1.4 Ability to choose appropriate quality attributes as defined by standards
	3.1.5 Explore and synthesize system requirements from larger social and professional concerns
	3.1.6 Ability to develop software requirement specifications (SRS).
3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Ability to explore design alternatives
	3.2.2 Ability to produce a variety of potential design solutions suited to meet functional requirements
	3.2.3 Identify suitable non functional requirements for evaluation of alternate design solutions.

3.3 Demonstrate an ability to select optimal design scheme for further development	3.3.1 Ability to perform systematic evaluation of the degree to which several design concepts meet the criteria
	3.3.2 Consult with domain experts and stakeholders to select candidate IT design solution for further development
3.4 Demonstrate an ability to advance an IT design to defined end state	3.4.1 Ability to refine architecture design into a detailed design within the existing constraints.
	3.4.2 Ability to implement and integrate the modules
	3.4.3 Ability to verify the functionalities and validate the design.

PO4: Conduct investigations of complex computing problems: Conduct investigations of complex problems using analysis, modelling, interpretation of data, and synthesis of information in order to reach valid conclusions

Competency	**Indicators**
4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.1 Define a problem for purposes of investigation, its scope and importance 4.1.2 Ability to choose appropriate procedure/algorithm, data set and test cases. 4.1.3 Ability to choose appropriate hardware/software tools to conduct the experiment.
4.2 Demonstrate an ability to design experiments to solve open ended problems	4.2.1 Design and develop appropriate procedures/methodologies based on the study objectives
4.3 Demonstrate an ability to analyze data and reach a valid conclusion	4.3.1 Use appropriate procedures, tools and techniques to collect and analyze data 4.3.2 Critically analyze data for trends and correlations stating possible errors and limitations 4.3.3 Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions 4.3.4 Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions

PO5:Modern Tool Usage: Design, monitor, manage, test, control, evaluate an existing

computer-based system, process, component or program and provide valid conclusions using software modeling, warehousing, mining and networking tools for application development.

Competency	Indicators
5.1 Demonstrate an ability to identify / create modern IT tools, techniques and resource	5.1.1 Identify modern computer based tools, techniques and resources for computer science activities 5.2.2 Create/adapt/modify/extend tools and techniques to solve IT/Computer problems
5.2 Demonstrate an ability to select and apply discipline specific tools, techniques and resources	5.2.1 Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance 5.2.2 Demonstrate proficiency in using discipline specific tools
5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an computer science problem	5.3.1. Discuss limitations and validate tools, techniques and resources 5.3.2 Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.

PO 6: Professional Ethics: Apply ethical principles and adhere to professional ethics and responsibilities and norms of Application Development.

Competency	Indicators
6.1 Demonstrate an ability to recognize ethical dilemmas	6.1.1 Identify situations of unethical professional conduct and propose ethical alternatives
6.2 Demonstrate an ability to apply the Code of Ethics	6.2.1 Examine and apply moral & ethical principles to known Case studies

PO7: Life-long Learning: Recognize the need for and an ability to engage in lifelong learning.

Competency	Indicators
7. 1 Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	7.1.1 Describe the rationale for requirement for continuing professional development
	7.1.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap
7.2 Demonstrate an ability to identify changing trends in IT/Computer science	7.2.1 Identify historic points of technological advance in Information

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knowledge and practice	Technology that required practitioners to seek education in order to stay current 7.2.2 Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field
7.3 Demonstrate an ability to identify and access sources for new information	7.3.1 Source and comprehend technical literature and other credible sources of information 7.3.2 Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.

PO8: Project management and finance: Demonstrate knowledge and understanding of IT and management principles and apply these to one's own work, as a member or a leader of the team, to manage IT projects.

Competency	Indicators
8.1 Demonstrate an ability to evaluate the economic and financial performance of an IT & Management activity	8.1.1 Describe various economic and financial costs/benefits of IT & Management activity
	8.1.2 Analyze different forms of financial statements to evaluate the financial status of an IT project
8.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an IT & Management activity	8.2.1 Analyze and select the most appropriate proposal based on economic and financial considerations
8.3 Demonstrate an ability to plan/manage an IT & Management activity within time and budget constraints	8.3.1 Identify the tasks required to complete an IT & Management activity, and the resources required to complete the tasks. 8.3.2 Use project management tools to schedule an IT & Management project so it is completed on time and on budget

PO9: Communication Efficacy: Communicate effectively using classic and modern technology with the IT professionals and with society at large through report writing as well as technical presentations.

Competency	Indicators
9.1 Demonstrate an ability to comprehend technical literature and document project work	**9.1.1** Read, understand and interpret technical and non- technical information 9.1.2 Produce clear, well-constructed, and well-supported written documents 9.1.3. Create flow in a document or presentation - a logical progression of

	ideas so that the main point is clear
9.2. Demonstrate competence in listening, speaking, and presentation	**9.2.1** Listen to and comprehend information, instructions, and viewpoints of others **9.2.2** Deliver effective oral presentations to technical and non- technical audiences
9.3 Demonstrate the ability to integrate different modes of communication	**9.3.1** Create IT-standard figures, reports and drawings to complement writing and presentations 9.3.2 Use a variety of media effectively to convey a message in a document or a presentation

PO10: Societal and Environmental Concern: Understand the impact of the applications and services in societal and environmental contexts, and exhibit the knowledge of, and need for sustainable development

Competency	Indicators
10.1 Demonstrate an understanding of the impact of Application and services on social, environmental and in economic contexts	10.1.1 Identify risks/impacts in the life-cycle of an IT product or activity 10.1.2 Understand the relationship between the technical, socio economic and environmental dimensions of sustainability
10.2 Demonstrate an ability to apply principles of sustainable design and development	10.2.1 Describe management techniques for sustainable development 10.2.2 Apply principles of sustainable design and development to an IT activity or product relevant to the discipline

PO11: Individual and Team Work: Function effectively as an individual, and as a member or leader of a team.

Competency	Indicators
11.1 Demonstrate an ability to form a team and define a role for each member	**11.1.1** Recognize a variety of working and learning preferences; appreciate the value of diversity on a team **11.1.2** Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
11.2 Demonstrate effective individual and team operations-- communication, problem solving, conflict resolution and leadership skills	11.2.1 Demonstrate effective communication, problem solving, conflict resolution and leadership skills 11.2.2 Treat other team members

	respectfully
	11.2.3 Listen to other members ure in difficult Situations

PO12: Innovation and Entrepreneurship: Create opportunity to produce successful Entrepreneur.	
Competency	**Indicators**
P12.1 Demonstrate an ability in graduates to have an entrepreneurial vision and entrepreneurial will.	P12.1.1 able to identify entrepreneurial opportunities that exist by applying existing technologies. P12.1.2 able to create entrepreneurial opportunities through the invention, development and exploitation of new ideas
P12.2 Demonstrate an ability to formulate an innovative solution plan and methodology.	P12.2.1 Identify innovative solution / methods to solve the problem.