Shri G S Institute of Technology & Science, Indore

Department of Computer Engineering

Minutes of Meeting of Board of Studies in Computer Engineering, held on 18th July, 2020

A meeting of Board of Studies in Computer Engineering was held on 18th July, 2020 at 4:00 pm on Webex online meeting platform.

Following members attended the meeting:

1) Dr. Urjita Thakar (Chairperson)
2) Mr. V.R. Sathe, IT Consultant, Indore (External Expert, Member)
3) Dr. B.K. Joshi, Professor, Computer Engineering, MCTE, Mhow (External Expert, Member)
4) Dr. Vahida Attar, Prof. & Head, Deptt of Comp. Engg, CoEP, Pune (External Expert, Invitee)
5) Prof. D.C. Jinwala, Professor, Deptt of Comp. Engg, SVNIT, Surat (External Expert, Invitee)
6) Prof. D. A. Mehta (Member)
7) Mr. Surendra Gupta (Member)
8) Dr. Vandan Tewari (Member)
9) Mr. Rajesh Dhakad (Member)
10) Dr. Anuradha Purohit (Member)
11) Ms. Priyanka Bamne (Invitee)
12) Ms. Neha Mehra (Invitee)
13) Ms. Jyoti Tiwari (Invitee)

Following are the deliberations:

Item no. 1: To prepare the schemes of 3rd and 4th year B.Tech. Computer Sc. & Engineering, in light of AICTE guidelines

After thorough discussion, schemes of 3rd and 4th Year B.Tech. Computer Sc. & Engg. were prepared and are enclosed herewith (Annexure-I and II) along with the syllabi of subjects.
Some of the Subjects of the existing schemes of 3rd/4th year B.E. are part of the 3rd/4th year B.Tech. schemes also, with same syllabi. For such subjects (indicated in the enclosed schemes), common Question papers can be set for ex-students of 3rd/4th year B.E. and students of 3rd/4th year B.Tech.

The new schemes will be applicable to students admitted in year 2018-19 in first year B.Tech.

It was further recommended that:

1) In every semester of II Yr to IV Yr, upto 20% Theory subjects can be offered through well reputed MOOCs platforms like NPTEL, Coursera, EDX etc. However, internal tests and final exam for such subjects should be conducted by the Institute as usual.
2) In every semester of II Yr to IV Yr, in each practical subject, upto 20% experiments can be carried out on virtual lab platforms like MHRD's VLab portal, Bodhitree etc.

Item no. 2: To consider the revision of M.E. Computer Engineering scheme

After thorough discussion, the present scheme of M.E. Computer Engg. was revised and is enclosed herewith (Annexure III) alongwith the syllabi of newly added subjects.

It was further recommended that:

1) In every semester, upto 20% Theory subjects can be offered through well reputed MOOCs platforms like NPTEL, Coursera, EDX etc. However, internal tests and final exam for such subjects should be conducted by the Institute as usual.
2) In every semester, in each practical subject, upto 20% experiments can be carried out on virtual lab platforms like MHRD's VLab portal, Bodhitree etc.

The revised scheme is recommended to be made applicable to students admitted in year 2020-21.

Item no. 3: To review the Vision, Mission statements of Department

Valuable inputs were given by external experts for reframing of vision and mission statements, based on which, these statements will be revised, if felt necessary.

Item no. 4: To review the Program Educational Objectives (PEOs) and Program Specific Objectives (PSOs) of programs B.Tech. Computer Science and Engineering and M.E. Computer Engineering

Valuable inputs were given by external experts for reframing of Program Educational Objectives (PEOs) and Program Specific Objectives (PSOs) of both the programs, based on which the PEOs and PSOs will be revised.

Item no. 5: Any other item with the permission of Chair

As per request of Chairman, BoS, Electronics and Telecommunication, subject 'Data Science' is recommended for inclusion in scheme of semester VII B.Tech. Electronics and Telecommunication. Syllabus of the subject is enclosed.

The meeting ended with a vote of Thanks to the Chair.

Signatures of Members:

1) Dr. Urjita Thakar
2) Mr. V.R. Sathe Attended online
3) Prof. B.K. Joshi Attended online
4) Dr. Vahida Attar Attended online
5) Prof. D.C. Jinwala Attended online
6) Prof. D. A. Mehta
7) Mr. Surendra Gupta
8) Dr. Vandan Tewari
9) Mr. Rajesh Dhakad
10) Dr. Anuradha Purohit
11) Ms. Priyanka Bamne
12) Ms. Neha Mehra
13) Ms. Jyoti Tiwari

SCHEME OF EXAMINATION FOR STUDENT ADMITTED IN 2018 – 19 IN FIRST YEAR

B.TECH. I YEAR COMPUTER SCIENCE & ENGINEERING

SEMESTER 'A'

Subject Category	Subject Code	Subject Name	Hours per Week			Credits		Max. Marks				
			L	T	P	Th	Pr	Theory		Practical		Total
								Th	CW	SW	Pr	
BSC	MA10001	Mathematics – I	3	1	0	4	0	70	30	0	0	100
BSC	PH10006	Physics	3	1	2	4	1	70	30	20	30	150
ESC	CE10003	Fundamentals of Civil Engineering & Applied Mechanics	3	0	2	3	1	70	30	20	30	150
ESC	ME10149	Engineering Graphics	2	0	4	2	2	70	30	40	60	200
ESC	EE10005	Fundamentals of Electrical Engineering	3	0	2	3	1	70	30	20	30	150
MC	CH10200*	Environmental Science	0	1	2	-	-	0	0	100	0	100
		Total	14	3	12	16	5	350	150	200	150	850

SEMESTER 'B'

Subject Category	Subject Code	Subject Name	Hours per Week			Credits		Max. Marks				
			L	T	P	Th.	Pr.	Theory		Practical		Total
								Th.	CW	SW	Pr	
BSC	MA10501	Mathematics- II	3	1	0	4	0	70	30	0	0	100
BSC	CH10506	Chemistry	3	1	2	4	1	70	30	20	30	150
HSMC	HU10651	Technical English	3	0	2	3	1	70	30	20	30	150
ESC	CO10648	Programming for Problem Solving	3	0	2	3	1	70	30	20	30	150
ESC	ME10649	Fundamentals of Mechanical Engineering	3	0	2	3	1	70	30	20	30	150
ESC	IP10650	Manufacturing Practices & Workshop	0	1	4	1	2	0	0	40	60	100
MC	HU10700*	Universal Human Values Groups	2 Hrs. per week working Saturday					0	0	100	0	100
		Total	15	3	12	16	6	350	150	220	180	900

*Mandatory Noncredit course PASS/FAIL status will appear in marksheet

B.TECH. II YEAR COMPUTER SCIENCE & ENGINEERING

ESTER 'A'

Category	Subject Code	Subject Nomenclature	Hours per Week			No. of Credits			Maximum Marks				
			L	T	P	Th	Pr	Total	Th	CW	Pr	SW	Total
BSC	MA 24003	Mathematics -III	3	1	-	4	-	4	70	30	-	-	100
PCC	CO 24057	Object Oriented Programming Systems	3	1	2	4	1	5	70	30	60	40	200
PCC	CO 24008	Computer Architecture	3	-	2	3	1	4	70	30	60	40	200
ESC	EC ------	Digital Electronics	3	-	2	3	1	4	70	30	60	40	200
HSMC	HU 24005	Economics for Engineers	3	-	-	3	-	3	70	30	-	-	100
PLC	CO 24497	Programming Practices	-	1	2	1	1	2	-	-	60	40	100
ESC / EC	EC 24498	Electronics Workshop	-	-	2	-	1	1	-	-	60	40	100
	Total		15	3	10	18	5	23	350	150	300	200	1000

MESTER 'B'

Category	Subject Code	Subject Nomenclature	Hours per Week			No. of Credits			Maximum Marks				
			L	T	P	Th	Pr	Total	Th	CW	Pr	SW	Total
PCC	CO 24553	Discrete Structures	3	-	-	3	-	3	70	30	-	-	100
BSC	MA 24554	Mathematics - IV	3	1	-	4	-	4	70	30	-	-	100
PCC	CO 24507	Data Structures	3	1	2	4	1	5	70	30	60	40	200
PLC	CO _____	Operating Systems	3	-	2	3	1	4	70	30	60	40	200
	EC _____	Digital Communication	3	-	2	3	1	4	70	30	60	40	200
	CO 24992	Computer Workshop	-	-	2	-	1	1	-	-	30	20	50
EC	CO ------	Design thinking Lab-I	-	-	2	-	1	1	-	-	30	20	50
HSBC	HU 24505	Values, Humanities and Professional Ethics	-	2	-	2	-	2	-	100	-	-	100
	Total		15	4	10	19	5	24	350	250	240	160	1000

...ship / training in industry or organization of minimum 2 weeks to be carried out after sem. "A" or Sem. "B" but before ...mencement of III Year Sem. "A". Evaluation shall be done in III Year Sem. "A".

Annexure-I

B.TECH. III YEAR COMPUTER SCIENCE & ENGINEERING (wef. 2020-21)

MESTER 'A'

Sr.	Category	Subject Code	Subject Nomenclature	Hours Per Week			No. of Credits			Maximum Marks				
				L	T	P	Th.	Pr.	Total	Th.	CW	Pr.	SW	Total
	PCC	CO	*Theory of Computation	3	1	-	4	-	4	70	30	-	-	100
	PCC	CO	*Computer Networks	3	-	2	3	1	4	70	30	60	40	200
	PCC	CO	*Data Base Management Systems	3	1	2	4	1	5	70	30	60	40	200
	PCC	CO	Agile Software Methodology*	3	-	2	3	1	4	70	30	60	40	200
	LC	CO	Skill Development Lab	-	-	2	-	1	1	-	-	30	20	50
	LC	CO	Design Thinking Lab-II	-	-	2	-	1	1	-	-	30	20	50
	SI	CO	Evaluation of Industrial Training/Internship-I	-	-	-	-	2	2	-	-	-	100	100
	OE C	CO	Open Elective Course-I	3	1	-	4	-	4	70	30	-	-	100
				15	3	10	18	7	25	350	150	240	260	1000

SEMESTER 'B'

Sr.	Category	Subject Code	Subject Nomenclature	Hours Per Week			No. of Credits			Maximum Marks				
				L	T	P	Th.	Pr.	Total	Th.	CW	Pr.	SW	Total
	PCC	CO	* Design and Analysis of Algorithms	3	-	2	3	1	4	70	30	60	40	200
	PCC	CO	Machine Learning	3	-	2	3	1	4	70	30	60	40	200
	PCC	CO	Foundation of Information Security	3	-	-	3	-	3	70	30	-	-	100
	PCC	CO	Internet of Things	-	1	2	1	1	2	-	-	60	40	100
	PEC	CO	Elective I	3	-	2	3	1	4	70	30	60	40	200
	PROJ	CO	Major Project Planning and Seminar	-	-	4	-	2	2	-	-	60	40	100
	OC	OC	Open Elective Course-II	3	1	-	4	-	4	70	30	-	-	100
			Total	15	2	12	17	6	23	350	150	300	200	1000

...nship / training in industry or organization of minimum 2 weeks to be carried out after sem. "A" or Sem. "B" but before ...mencement of IV Year Sem. "A". Evaluation shall be done in IV Year Sem. "A".

...mmon Question paper can be set for these subjects, for III yr. BE students (ex-students) and III yr. B.Tech. students.

Annexure-II

B.TECH. IV YEAR COMPUTER SCIENCE & ENGINEERING (wef. 2021-22)

SEMESTER 'A'

S.No	Category	Code No	Subject Nomenclature	Hours Per Week			No. of Credits		Total	Maximum Marks				Total
				L	T	P	L	P		Th	CW	SW	Pr	
1	PEC		Elective – II	3	-	2	3	1	4	70	30	60	40	200
2	PEC		Elective – III	3	-	2	3	1	4	70	30	60	40	200
3	PLC		Elective – IV	3	-	2	3	1	4	70	30	60	40	200
4	LC	CO____	System Operations Lab	-	-	2	-	1	1	-	-	40	60	100
5	PROJ	CO____/ CO____	Project Phase-I/ Project Phase-II	-	-	4	-	2	2	-	-	80	120	200
6	SI	CO____	Internship Evaluation - II	-	-	-	-	2	2	-	-	100	-	100
			Total	9	-	12	9	8	17	210	90	400	300	1000

SEMESTER 'B'

S.No	Category	Code No	Subject Nomenclature	Hours Per Week			No. of Credits		Total	Maximum Marks				Total
				L	T	P	L	P		Th	CW	SW	Pr	
1	PEC		Elective –V	2	-	2	2	1	3	70	30	40	60	200
2	PEC		Elective – VI	2	-	-	2	-	2	70	30	-	-	100
3	PROJ	CO___/ CO____	Project Phase - II / Project Phase – I	-	-	4	-	2	2	-	-	80	120	200
4	SI	CO____	Internship Evaluation - III	-	-	-	-	4	4	-	-	100	-	100
			Total	4	-	6	4	7	11	140	60	220	180	600

t of Electives and Open Electives

Elective I

	CO	Data Science & Engineering
	CO	Compiler Construction
	CO	Wireless & Mobile Networks
	CO	Object Oriented Software Engineering
	CO	Computer Graphics
	CO	Embedded Systems

Elective-II

1	CO	Computational Intelligence
2	CO	Advanced Data Structures
3	CO	Cloud and Distributed Computing
4	CO	Software Architecture
5	CO	Multimedia System
6	CO	VLSI System Design

Elective-III

	CO	Deep Learning
	CO	Advanced Algorithms
	CO	Big Data
	CO	Human Computer Interaction
	CO	Real Time Systems
	CO	Software Verification

Elective-IV

1	CO	Reinforcement Learning
2	CO	Advanced Databases
3	CO	Cyber Security and Forensics
4	CO	Web Technologies
5	CO	Virtual Reality
6	CO	Robotics

Elective-V

	CO	Bioinformatic Computing
	CO	High Performance Computing
	CO	Machine Learning for Security
	CO	Game Design
	CO	Digital Signal Processing
	CO	Security in Resource Constrained Environment

Elective-VI

1	CO	Natural Language Processing
2	CO	Advances in Operating Systems
3	CO	Network Management & Maintenance
4	CO	Software Project Management
5	CO	Image Processing and Computer Vision
6	CO	Block Chain Technology

Open Elective-I
(For Computer Engineering Students)

Artificial Intelligence

For Non-Computer Engineering Students)

Software Development Methodology

Artificial Intelligence

Open Elective-II
(For Computer Engineering Students)

1		Android Application Development
2		Open Source Technologies
3		IT Act
4		

For Non-Computer Engineering Students

1		Android Application Development

mmon Question paper can be set for these subjects, for students under this scheme and under the eme of IV yr B E

Annexure-III

SCHEME OF EXAMINATION
M.E. COMPUTER ENGINEERING
(wef. 2020-21)

SEMESTER - I

Subject Code	Subject	No. of Hours			No. of Credits			Maximum Marks				
		L	T	P	Th.	Pr.	Total	Th.	CW	Pr.	SW	Total
CO ___	Programming Systems	3	1	-	4	-	4	70	30	-	-	100
CO ___	Modern Computer Networks	3	-	-	3	-	3	70	30	-	-	100
CO ___	Advances in Operating Systems	3	-	-	3	-	3	70	30	-	-	100
CO ___	Agile Software Development	3	-	-	3	-	3	70	30	-	-	100
CO ___	Elective – I	3	-	-	3	-	3	70	30	-	-	100
CO 71451	Laboratory-I	-	-	4	-	2	2	-	-	60	40	100
CO 71452	Laboratory-II	-	-	6	-	3	3	-	-	60	40	100
CO 71500	Comprehensive Viva	-	-	-	-	-	-	-	-	Grade	-	Grade
	Total	15	1	10	16	5	21	350	150	120	80	700

SEMESTER - II

Subject Code	Subject	No. of Hours			No. of Credits			Maximum Marks				
		L	T	P	Th	Pr	Total	Th	CW	Pr	SW	Total
CO ___	Database Engineering	3	-	-	3	-	3	70	30	-	-	100
CO ___	Algorithmics	3	1	-	4	-	4	70	30	-	-	100
CO ___	Elective – II	3	-	-	3	-	3	70	30	-	-	100
CO ___	Elective – III	3	-	-	3	-	3	70	30	-	-	100
CO ___	Elective –IV	3	-	-	3	-	3	70	30	-	-	100
CO 71851	Laboratory-III	-	-	4	-	2	2	-	-	60	40	100
CO 71852	Laboratory IV	-	-	6	-	3	3	-	-	60	40	100
CO 71853	Research Methodology & Seminar	-	-	2	-	1	1	-	-	-	100	100
CO 71900	Comprehensive Viva	-	-	-	-	-	-	-	-	Grade	-	Grade
	Total	15	1	12	16	06	22	350	150	120	180	800

MESTER - III

Sr. No.	Subject Code	Subject	No. of Periods			No. of Credits			Maximum Marks				
			L	T	P	Th	Pr.	Total	Th.	CW	Pr.	SW	Total
	CO 7167	Dissertation Phase-I	-	-	20	-	20	20	-	-	150	100	250
		Total	-	-	20	-	20	20	-	-	150	100	250

MESTER - IV

Sr. No.	Subject Code	Subject	No. of Periods			No. of Credits			Maximum Marks				
			L	T	P	Th	Pr.	Total	Th.	CW	Pr.	SW	Total
	CO 7194	Dissertation Phase-II	-	-	30	-	30	30	-	-	240	160	400
		Total	-	-	30	-	30	30	-	-	240	160	400

T OF ELECTIVES

MESTER - I
ctive - I
- O _____ Machine Learning
- O _____ Information Security
- O _____ Web based Application Development
- O _____ Augmented and Virtual Reality
- O _____ Multimedia Systems

MESTER - II
ctive - II
- CO _____ Data Science & Engineering
- CO _____ Cyber Security and Forensics
- CO _____ Object Oriented Software Engineering
- CO _____ Robotics
- CO _____ Game Design

tive - III
- _____ Deep and Reinforcement Learning
- _____ Embedded Systems and Internet of Things
- O _____ Software Architecture
- O _____ Human Computer Interaction

ctive - IV
- O _____ Computational Intelligence
- _____ Cloud Computing
- _____ Big Data
- _____ Image Processing and Computer Vision
- O _____ Block Chain Technologies

CO_____: AGILE SOFTWARE DEVELOPMENT (B.E.)

Pre-Requisite: Nil

Course Outcomes:

After completing the course student should be able to:

1. Describe the fundamental principles and practices associated with software development process models.
2. Compare agile software development model with traditional development models and identify the benefits and pitfalls.
3. Use techniques and skills to establish and mentor Agile Teams for effective software development.
4. Apply core values and principles of Agile Methods in software development.

Course Contents:

UNIT 1. Software Engineering: Fundamentals of Software Engineering Concepts and Process; Software Development Life Cycle: Important Steps and Effort Distribution; Overview of Software Development Models like Prototype Model, Incremental Model, Spiral Model, RAD.

UNIT 2. Fundamentals of Agile Process: Introduction and Background, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models, Planning for Agile Teams, Agile Project Lifecycles, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives, Agile Documentations.

UNIT 3. Agile Requirements, Design and Development: Impact of Agile Processes in Requirement Engineering, Current Agile Practices, Requirements Elicitation and Management, Agility in Design, Agile Architecture, Agile Design Practices, Role of Design Principles, Agile Product Development, Automated build tools; Pair Programming.

UNIT 4. Introduction to Scrum and Extreme Programming (XP): Agile Scrum Framework; Scrum Artifacts, Meetings, Activities and Roles; Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting, User story definition and Characteristics; XP Lifecycle, XP Team, Refactoring, Applying XP, XP and Scrum Case Study.

UNIT 5. Agile Testing and Review: Agile Testing Techniques, Test-Driven Development, User Acceptance Test, Agile Metrics and Measurements, Agile Approach to Estimating and Project Variables, Agile Measurement, Agile Control: the 7 control parameters; Product Quality, Agile approach to Risk, Agile Approach to Configuration Management, Agility and Quality Assurance.

Recommended Books:

1. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
2. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison Wesley, 2012.
3. James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
4. Craig Larman, —Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
5. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.
6. Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
7. Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.

Research Journals:

1. IEEE Transactions on Software Engineering
2. IEEE Transactions on Dependable and Secure Computing
3. IET Software
4. ACM Transactions on Software Engineering and Methodology (TOSEM)
5. ACM SIGSOFT Software Engineering Notes

CO : MACHINE LEARNING

Pre-Requisite: Computer Programming using python or R language

Course Outcomes:

After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms in machine learning.
2. Find and analyze the optimal hyper parameters of the machine learning algorithms.
3. Examine the nature of a problem at hand and determine whether a machine learning can solve it efficiently enough.
4. Solve and implement the real world problems using machine learning.

Course Contents:

UNIT 1. Introduction to machine learning (ML): Basics of ML, History of ML, Evolution of ML, ML Models, Learning and testing models, ML Algorithm and Convergence, ML Techniques, Types of ML, supervised and unsupervised learning, classification and clustering, Applications of ML, .Bias-Variance tradeoff.

UNIT 2. Neural Networks: McCulloch Pitts Neuron models, Activation Functions, Loss Functions, perceptron, Gradient Descent, Multilayer neural networks: back-propagation, backpropagation calculus, Initialization, Training rules, issues in back-propagation, Bayesian Learning, Competitive learning and self-organization map.

UNIT 3. Support Vector Machines(SVM): SVM Formulation, Interpretation & Analysis, hard and soft margin, Hinge loss, SVM dual, SVM tuning parameters, SVM Kernels, twin SVM.

UNIT 4. Clustering: K-Means Clustering, Mean Shift Clustering, Aagglomerative clustering, Association Rule Mining, Partition Clustering, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering, Gaussian Mixture Models, and Expectation Maximization. Parameters estimations – MLE,MAP,

UNIT 5. Learning Theory: Probably Approximately Correct (PAC) Model, PAC Learnability, Agnostic PAC Learning, Theoretical analysis of machine learning problems and algorithms, Generalization error bounds, VC Model, ML Tools.

Recommended Books:

1. Tom Mitchell, Machine Learning, McGraw-Hill, 1997.
2. Leonard Kaufman and P. J. Rousseau. Finding groups in data: An introduction to cluster analysis, Wiley, 2005
3. Nello Cristianini and John Shawe-Taylor, An Introduction to Support Vector Machines, Cambridge University Press, 2000.
4. Bernhard Scholkopf and Alexander J. Smola, Learning with Kernels, MIT Press, 2002.
5. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press.,2014

Research Journals:

1. IEEE Transaction on Neural Networks and Learning Systems
2. ACM Journal of Machine Learning Research

CO : ARTIFICIAL INTELLIGENCE

Pre-Requisite: Computer Programming and Statistics

Course Outcomes:

After completing the course student should be able to:

1. Describe fundamentals of Artificial Intelligence (AI) and its foundations.
2. Understand formal methods of knowledge representation, logic and reasoning.
3. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
4. Demonstrate awareness and understanding of various applications of AI techniques in intelligent agents, expert systems and other machine learning models.

Course Contents:

UNIT 1. Introduction to Artificial Intelligence (AI): Basics, The Foundations of AI, History of AI, Intelligent Agents; Problem Solving by Searching: Problem spaces and search, Uninformed strategies-BFS, DFS, Dijkstra, Informed Strategies- A* Search, Heuristic Functions, Hill-climbing, Adversarial Search- Minimax Algorithm, Alpha-beta Pruning, Constraint Satisfaction Problems.

UNIT 2. Knowledge Representation: Knowledge-Based Agents, Representations and Mappings, Issues, Propositional Logic and Predicate Logic, First Order Logic and Inference, Ontological Engineering, Semantic Networks, Categories and Objects, Events.

UNIT 3. Reasoning: Quantifying Uncertainty, Baye's Rule and Its Use, Naive Bayes Models, Probabilistic Reasoning: Semantics and Inference in Bayesian Networks, Probabilistic Reasoning over Time: Time and Uncertainty, Inference in Temporal Models, Hidden Markov Models and other Models.

UNIT 4. Expert Systems: Architecture of Expert Systems, Features, Roles of Expert Systems: Knowledge Acquisition, Meta knowledge, Heuristics, Knowledge Representation in Expert Systems; Typical Expert Systems: MYCIN, DART, XCON etc.; Expert System Tools and Shells.

UNIT 5. AI Applications: Case Study of Various Applications of AI in Game Playing, Natural Language Processing, Computer-Vision, Robotics etc.

Recommended Books:

1. Russel,S., and Norvig,P., "Artificial Intelligence: A Modern Approach", 4th Edition, 2020, Pearson.
2. Elaine Rich,Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", 3rd Edition, 2008, McGraw-Hill International.
3. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, 2015, Morgan-Kauffman, Morgan-Kaufmann.
4. Janakiraman, K.Sarukesi, 'Foundations of Artificial Intelligence and Expert Systems', 2005, Macmillan Series in Computer Science.

5. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 5th Edition, 2003, Prentice Hall of India.

Research Journals:

1. IEEE Transactions on Artificial Intelligence
2. IEEE Transactions on Pattern Analysis and Machine Intelligence
3. Elsevier Journal on Artificial Intelligence
4. Elsevier Journal on Information Fusion
5. Elsevier Journal on Expert Systems with Applications
6. IEEE Transactions on Systems, Man and Cybernetics
7. IEEE Transaction on Neural Networks and Learning Systems
8. IEEE Transaction on Fuzzy Systems
9. ACM Transactions on Intelligent Systems and Technology
10. ACM Journal of Machine Learning Research

CO_____ :PROGRAMMING SYSTEMS

Course Outcomes:

After completing the course student should be able to:

1. Develop ability to write a computer program to solve specified problems.
2. Develop skills in algorithmic problem-solving, expressed in a programming language like C, C++, python, Java.
3. Write and document the quality program.
4. Solve the real world business problems.

Course Contents:

UNIT 1. Fundamentals of programming systems, elements of programming systems, basic data types and their memory representations, Operators and Expressions, I/O streams, statements, Sequential and conditional execution, Iterative solutions, arrays, matrices and their applications, Strings, Elements of string processing.

UNIT 2. Introduction to pointers, types of pointers, arithmetic of pointers and use of pointers in applications, functions, types of functions, declaration, definition, scope, parameter passing and recursion, structures, union, pointers to structures, file processing, file creation, I/O operations on files, file functions, working with text and binary files.

UNIT 3. Introduction to Standard Template Library (STL): components of STL: containers, iterators, algorithms, functions, Introduction to container, types of containers and their use, types of Iterators, building application using STL, boots libraries.

UNIT 4. Programming life cycles, coding standards, code tuning techniques, version controlling: Git, CVC etc. Internals of program compilation and execution, Programming errors and error handling. Documentation tools: LaTex, bibtex etc.

UNIT 5. Introduction to object oriented Programming paradigm: object, class, object oriented design principles: encapsulation, information hiding, inheritance, Polymorphism, Overriding & Overloading, Comparison of Procedural and Object Oriented Programming paradigm.

Recommended Books:

1. Yeshwant Kanetkar, "Let us C", BPB Publications, 2002.
2. B. Kernighan & D. Ritchie, " The ANSI C programming Language", PHI, 2000
3. R.G. Dromey, "How to solve it by computer", PHI,1992
4. Jumping into C++ by Alex Allain. ISBN-13: 978-0988927803
5. Timothy Budd, "An Introduction to Object-Oriented Programming", Addison-Wesley Publication, 3rd Edition 2002.
6. G. Booch, "Object Oriented Analysis & Design", Addison Wesley, 2006
7. Herbert Schildt, "Java 2: The Complete Reference", McGraw-Hill Osborne Media, 11th Edition, 2018.

CO_____: AGILE SOFTWARE DEVELOPMENT (M.E.)

Pre-Requisite: NIL

Course Outcomes:

After completing the course student should be able to:

1. Describe the fundamental principles and practices associated with each of the agile development methods.
2. Compare agile software development model with traditional development models and identify the benefits and pitfalls.
3. Use techniques and skills to establish and mentor Agile Teams for effective software development.
4. Apply core values and principles of Agile Methods in software development.

Course Contents:

UNIT 1. Review of Software Engineering: Software Engineering Fundamentals and Principles; Software Development Life Cycle: Important Steps and Effort Distribution; Overview of Process Models like Iterative Model, Spiral Model, Incremental Model, RAD.

UNIT 2. Fundamentals of Agile Process: Introduction and Background, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models, Planning for Agile Teams, Agile Project Lifecycles, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives, Agile Documentations.

UNIT 3. Agile Requirements, Design and Development: Impact of Agile Processes in Requirement Engineering, Current Agile Practices, Requirements Elicitation and Management, Agility in Design, Agile Architecture, Agile Design Practices, Role of Design Principles, Agile Product Development, Automated build tools; Pair programming.

UNIT 4. Introduction to Scrum and Extreme Programming (XP): Agile Scrum Framework; Scrum Artifacts, Meetings, Activities and Roles; Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting, User story definition and Characteristics; XP Lifecycle, XP Team, Refactoring, Applying XP, XP and Scrum Case Study.

UNIT 5. Agile Testing and Review: Agile Testing Techniques, Test-Driven Development, User Acceptance Test, Agile Metrics and Measurements, Agile Approach to Estimating and Project Variables, Agile Measurement, Agile Control: the 7 control parameters; Agile approach to Risk, Agile Approach to Configuration Management, Agility and Quality Assurance.

Recommended Books:

1. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
2. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison Wesley, 2012.
3. Succeeding with Agile : Software Development Using Scrum, Pearson ,2010.
4. James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
5. Craig Larman, —Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
6. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.
7. Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
8. Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.

Research Journals:

1. IEEE Transactions on Software Engineering
2. IEEE Transactions on Dependable and Secure Computing
3. IET Software
4. ACM Transactions on Software Engineering and Methodology (TOSEM)
5. ACM SIGSOFT Software Engineering Notes