CMR INSTITIUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LESSON PLAN – EVEN SEM – 2018

SEMESTER – 04

Course Objectives

CMR Institute of Technology, Bangalore		
Department(s): Computer Science & Engineering		
Semester: 04	Section(s): B&C	Lectures/week: 05
Subject: Engineering Mathematics-IV		Code: 15MAT41
Course Instructor(s): Mrs. Arti Chudasama		
Course duration: 05 Feb 2018 – 23 May 2018		
Course Site: https://sites.google.com/a/cmrit.ac.in/arti-c		

- The purpose of this course is to make students well conversant with numerical methods to solve ordinary differential equations, complex analysis, sampling theory and joint probability distribution and stochastic processes.

Prerequisites

- Basic Differential and Integral Calculus
- Power series expansions of functions
- Limits, Continuity and differentiability of functions of real variables
- Complex numbers—Representation in Cartesian and Polar form, Algebra of complex numbers,
- De Moivre theorem
- Basics of Probability
- Mean Standard deviation of ungrouped data.

Lesson Plan

Lecture #	Book & Sections	Topics	Portions coverage	
			Teaching Aids	% of Syllabus Covered
1-17	TB2: 13.1,13.2 TB1: 20.1-20.5, 20.7-20.10, 20.12-20.14, 20.18	**Complex Variables (Module-3)** Function of a complex variable, limits, continuity, differentiability Cauchy-Riemann equations in polar form, problems, Evaluation of line integrals, Cauchy's theorem, Evaluation of integrals, Evaluation of residues at poles, Evaluation of integrals using residue theorem	Chalk and Talk	20

		Problems on BLT, The mapping $w = e^{z}$, $w = z + 1/z$, $(z \neq 0)$		
Links to some useful online lectures: Introduction to complex functions: https://www.youtube.com/watch?v=iUhwCfz18os Conformal map: https://www.youtube.com/watch?v=CMMrEDIFPZY				
18-26	TB1: 32.1,32.3, 32.5,32.7, 32.9,32.10 TB1: 32.12	**Numerical Methods (Module-1 & 2)** Numerical Solution of 1st Order ODE- Taylor Series method, Modified Euler's method, Runge-Kutta method of 4th order, Milne's and Adams-Bashforth predictor and corrector method. Solution of second order differential equations— Runge-Kutta Method and Milne's Method.	Chalk and Talk	30
Links to some useful online lectures: Euler Method for Differential Equations - The Basic Idea https://www.youtube.com/watch?v=RGtCw5E7gBc				
27-41	TB1 26.7 - 26.16, 2.19(6) TB2:24.2, 24.3 RB2:31.1	**Probability Distributions (Module-4)** Probability- prerequisites, Random variables and probability distributions, Discrete probability distributions- mean and variance, problems. Continuous probability distributions- mean and variance, problems. Binomial Distribution, mean and variance of binomial distribution, Problems on binomial distribution, Poisson distribution, mean variance of Poisson distribution, Exponential distribution, Normal distribution, mean and variance of normal distribution Problems on normal distribution. **Joint probability distributions:** expectation, covariance, correlation coefficient Problems on joint probability distributions.	Chalk and Talk	20
Links to some useful online lectures: Pre requisites: https://www.youtube.com/watch?v=uzkc-qNVoOk&list=PLC58778F28211FA19 Random variables: https://www.youtube.com/watch?v=IYdiKeQ9xEI				

42-53	RB2: 31.2 TB1: 27.1 - 27.18	**Stochastic processes and Sampling theory (Module-5)** Stochastic processes- Introduction, regular stochastic matrix, Markov chain, transition matrix, problems on Markov Chain. Sampling theory- Introduction, sampling distribution of means and proportions , problems. Test of hypothesis and confidence intervals for means and proportions, problems. Test of hypothesis for difference of means and proportions, problems. Small samples- Student's t-distribution. Test of goodness of fit : Chi-square distribution.	Chalk and Talk	20
Links to some useful online lectures: ➢ Sampling distribution : https://www.youtube.com/watch?v=olK80ngCbXc ➢ Confidence Intervals: https://www.youtube.com/watch?v=9jTJD5SLweY ➢ Testing hypotheses: https://www.youtube.com/watch?v=vwWEa8wU_6U ➢ Introduction to Markov chains: https://www.youtube.com/watch?v=AaP8Zr0yoF4&t=151s				
54-63	TB1:16.1, 16.2,16.4-16.8,16.11,16.13,16.14	**Special Functions (Module-2)** Series solution of Legendre's differential equation leading to $P_n(x)$, Rodrigue's formula, Legendre polynomials, problems. Series solution of Bessel's differential equation leading to $J_n(x)$ by Frobenius method, properties of Bessel functions, recurrence relations, problems, Orthogonality of Bessel functions.	Chalk and Talk	10
Links to some useful online lectures: ➢ Series solution of ode: https://www.youtube.com/watch?v=c3XtwTsE7QY ➢ Legendre's ode: https://www.youtube.com/watch?v=3e5BUrtUKZc&t=11s ➢ Introduction to the Frobenius method: https://www.youtube.com/watch?v=_qQLuxYClA4				

Text Books	
1. 2.	B.S.Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd edition, 2015 E.Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
Reference Books	

1.	N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers,
2.	*B.V.Ramana: "Higher Engineering M athematics" Tata McGraw-Hill, 2006.*
3.	*H. K. Dass and Er. RajnishVerma: "Higher Engineerig Mathematics", S. Chand publishing, 1st edition, 2011.*

Syllabus for Internal Assessment Tests (IAT*)

IAT #	Syllabus
IAT-1	Class # 01 – 24
IAT-2	Class # 25– 44
IAT-3	Class # 45– 63

*See calendar of events for IAT schedule.

Course Outcomes
By the end of this course, students will be able to
1. Use appropriate single-step and multi-step numerical methods to solve first and second order ordinary differential equations.
2. Use Power Series method and Frobenius method to find the solution of second order differential equations such as Legendre and Bessel differential equations.
3. Apply the idea of analyticity and the calculus of residues to evaluate real and complex integrals and to describe conformal transformations.
4. Describe random variables and probability distributions using rigorous statistical methods and translate real-world problems into probability models.
5. Explain and successfully apply parametric testing techniques including single and multi-sample tests for mean and proportion.
6. Estimate the nature and strength of relationship between two variables of interest using joint probability distribution and describe a discrete time Markov chain in terms of a transition matrix.

**Based on table 01, 02, 03 in appendix, following are the Course outcomes.

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Use appropriate single-step and multi-step numerical methods to solve first and second order ordinary differential equations.	**1,2**	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO2	Use Power Series method and Frobenius method to find the solution of second order differential equations such as Legendre and Bessel differential equations.	**2**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO3	Apply the idea of analyticity and the calculus of residues to evaluate real and complex integrals and to describe conformal transformations.	**3**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO4	Describe random variables and probability distributions using	**4**	3	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-

	rigorous statistical methods and translate real-world problems into probability models.																		
CO5	Explain and successfully apply parametric testing techniques including single and multi-sample tests for mean and proportion.	**5**	2	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-
CO6	Estimate the nature and strength of relationship between two variables of interest using joint probability distribution and describe a discrete time Markov chain in terms of a transition matrix.	**5**	-	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-

Note: Assignments, study material, Question bank and other course related content would be posted on site mentioned above.

Appendix

Table 01: Cognitive Levels

Cognitive Levels	
Cognitive level	**Revised Blooms Taxonomy Keywords**
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

Table 02: Program Outcomes (PO) and Program Specific Outcomes (PSO)

Program Outcomes (PO), Program Specific Outcomes (PSO)	
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities

	with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Design, implement and maintain business applications in a variety of languages using libraries and frameworks.
PSO2	Develop and simulate wired and wireless network protocols for various network applications using modern tools.
PSO3	Apply the knowledge of software and design of hardware to develop embedded systems for real world applications.
PSO4	Apply knowledge of web programming and design to develop web based applications using database and other technologies

Table 03: Correlation Levels

Correlation Levels	
0	No Correlation
1	Slight/Low
2	Moderate/ Medium
3	Substantial/ High

CMR Institute of Technology, Bangalore		
Department(s): Computer Science & Engineering		
Semester: 04	Section(s): A&B&C	Lectures/week: 04
Subject: Software Engineering		Code: 15CS42
Course Instructor(s): Daminderjit Sunner		
Course duration: 05 Feb 2018 – 25 May 2018		
Course Site: https://sites.google.com/a/cmrit.ac.in/software-engineering-v-sem/		

Course Objectives

- Outline software engineering principles and activities involved in building large software programs.
- Identify ethical and professional issues and explain why they are of concern to software engineers.
- Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation.
- Differentiate system models, use UML diagrams and apply design patterns.
- Discuss the distinctions between validation testing and defect testing.
- Recognize the importance of software maintenance and describe the intricacies involved in software evolution.
- Apply estimation techniques, schedule project activities and compute pricing.
- Identify software quality parameters and quantify software using measurements and metrics.
- List software quality standards and outline the practices involved.
- Recognize the need for agile software development, describe agile methods, apply agile practices and plan for agility.

Pre requisites

- System Software

Lesson Plan				
Lecture #	**Book & Sections**	**Topics**	**Portions coverage**	
			Teaching Aids	% of Syllabus Covered
1-11	TB1: - 1, 2.1, 2.2, 2.3, 4	**Module 1** **Introduction**: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. **Software Processes**: Models: Waterfall Model, Incremental Model and Spiral Model. Process activities. **Requirements Engineering**: Requirements Engineering Processes. Requirements Elicitation and Analysis**.** Functional and non-functional requirements. The software Requirements Document . Requirements Specification. Requirements validation. Requirements Management.	Chalk and Talk Activity	20

Links to some useful online material: ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZb2FXZXkzVnk2eGs/view?usp=drive_web https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZOFNJVzlCZXZCVjg/view?usp=drive_web				
12-21	TB1 5, 2.4, 7	**Module 2** **System Models**: Context models . Interaction models. Structural models . Behavioral models . Model-driven engineering . **Design and Implementation**: Introduction to RUP, Design Principles. Object-oriented design using the UML. Design patterns . Implementation issues. Open source development.	Chalk and Talk Activity	20
Links to some useful online lectures: ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZdjR3WTRiT1piRlk/view?usp=drive_web ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZOFNJVzlCZXZCVjg/view?usp=drive_web				
22-32	TB1 8, 9	**Module 3** **Software Testing**: Development testing, Test-driven development, Release testing, User testing Test Automation. **Software Evolution**: Evolution processes. Program evolution dynamics. Software maintenance . Legacy system management. .	Chalk and Talk	20
Links to some useful online lectures: ➢ https://drive.google.com/open?id=1apqsxyUarWfUHc8g6rgGdMW-HS7pKQ6O ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZUXh0VWI5X28zVFlYNHlENnlFUUJXNTNCR2dZ/view?usp=drive_webU				
33-44	TB1 23.1- 23.3, 23.5, 24	**Module 4** **Project Planning**: Software pricing. Plan-driven development. Project scheduling: Estimation techniques. **Quality management**: Software quality. Reviews and inspections. Software measurement and metrics. Software standards.	Chalk and Talk Activity	20
Links to some useful online lectures: ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZSU5uOHlzSUZ0RHBEUXFISHRlWDItcldKaTVn/view?usp=drive_web ➢ https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZend0N1BoaFNGaGc/view?usp=drive_web				
45-50	TB1 2.3, 3 TB2	**Module 5** **Agile Software Development:** Coping with Change, The Agile Manifesto: Values and Principles. Agile methods: SCRUM and Extreme	Chalk and Talk	20

		Programming. Plan-driven and agile development. Agile project management , Scaling agile methods.		

Links to some useful online lectures:

- https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZOTdYVWVRNjQxR2FHV2tmNXdaZmtRLUtVNjU4/view?usp=drive_web
- https://drive.google.com/a/cmrit.ac.in/file/d/0B5LsP6IibCkZQlBSTDlaRTVkbEk/view?usp=drive_web
- https://docs.google.com/a/cmrit.ac.in/viewer?a=v&pid=sites&srcid=Y21yaXQuYWMuaW58c29mdHdhcmUtZW5naW5lZXJpbmctdi1zZW18Z3g6N2E5ODI4YzZhZGI4MDgzZg

Text Books	
1.	Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24)
2.	The SCRUM Primer, Ver 2.0, http://www.goodagile.com/scrumprimer/scrumprimer20.pdf
Reference Books	
2.	Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
3.	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India

Syllabus for Internal Assessment Tests (IAT*)

IAT #	Syllabus
IAT-1	Class # 01 – 18
IAT-2	Class # 19– 32
IAT-3	Class # 33– 50

*See calendar of events for IAT schedule.

Course Outcomes
By the end of this course, students will be able to
1. Design a software system, component, or process to meet desired needs within realistic constraints.
2. Assess professional and ethical responsibility.
3. Function on multi-disciplinary teams.
4. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
5. Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems.
6. Understand the importance of life-long learning.

**Based on table 01, 02, 03 in appendix, following are the Course outcomes.

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.	**1,2**	2	3	3	1	0	0	0	0	0	1	0	2	2	0	2	2
CO2	Assess professional and ethical responsibility.	**1**	0	0	0	0	0	2	2	3	0	0	0	0	0	0	0	0
CO3	Function on multi-disciplinary teams	**Mini-project, 5**	0	1	1	0	0	0	0	0	3	1	0	1	0	0	0	0
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice.	**2,3,4**	1	1	1	1	2	0	0	0	0	0	0	1	1	1	1	1
CO5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems	**1,2,3**	3	3	3	2	0	0	0	0	0	1	0	1	1	0	2	2
CO6	Understand the importance of life-long learning.	**Mini-project, 5**	0	0	0	0	2	0	0	0	1	1	2	3	2	2	1	1

Note: Assignments, study material, Question bank and other course related content would be posted on site mentioned above.

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Cognitive Levels	
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L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
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PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
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PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Design, implement and maintain business applications in a variety of languages using libraries and frameworks.
PSO2	Develop and simulate wired and wireless network protocols for various network applications using modern tools.
PSO3	Apply the knowledge of software and design of hardware to develop embedded systems for real world applications.
PSO4	Apply knowledge of web programming and design to develop web based applications using database and other technologies

Table 03: Correlation Levels

Correlation Levels	
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1	Slight/Low
2	Moderate/ Medium

3	Substantial/ High

CMR Institute of Technology, Bangalore		
Department(s): Computer Science & Engineering		
Semester: 04	Section: C	Lectures/week: 04
Subject: Design and Analysis of Algorithm		Code: 15CS43
Course Instructor(s): Reshma Shet		
Course duration: 01 Jan 2018 – 25 May 2018		
Course Site: https://sites.google.com/a/cmrit.ac.in/reshmas/		

Course Objectives

- Explain various computational problem solving techniques.
- Apply appropriate method to solve a given problem.
- Describe various methods of algorithm analysis.

Prerequisites

- Knowledge about different Data structures
- Algorithm Specifications

Lesson Plan

Lecture #	Book & Sections	Topics	Portions coverage	
			Teaching Aids	% of Syllabus Covered
1-11	**T1:1.3,1.4,2.1,2.2,2.3,2.4** **T2: 1.1,1.2,1.3**	**Module 1:** What is an Algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with. Important Problem Types: Sorting, Searching, String processing, Graph Problems, Combinatorial Problems. Fundamental Data Structures: Stacks, Queues, Graphs, Trees, Sets and Dictionaries.	Chalk and Talk Video Lectures for some topics	15

Links to some useful online lectures:

- https://www.youtube.com/watch?v=OpebHLAf99Y
- https://www.youtube.com/watch?v=z2pjGiaDUPo

12-20	**T1: 4.1,4.2,5.3** **T2:3.1,3.3,3.4, 3.8**	**Module 2:** Divide and Conquer: General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer. Decrease and Conquer Approach: Topological Sort	Chalk and Talk Video Lectures for some topics	15
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=JSceec-wEyw ➢ https://www.youtube.com/watch?v=PgBzjlCcFvc ➢ https://www.youtube.com/watch?v=x78uQu730b0				
21-30	**T1:9.1,9.2,9.3,9.4,6.4** **T2:4.1,4.3,4.5**	**Module 3**: Greedy Method: General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines. Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm. Single source shortest paths: Dijkstra's Algorithm. Optimal Tree problem: Huffman Trees and Codes. Transform and Conquer Approach: Heaps and Heap Sort.	Chalk and Talk Video Lectures for some topics	10
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=1057z9XTfcs ➢ https://www.youtube.com/watch?v=WOCV2UcxNrI ➢ https://www.youtube.com/watch?v=Pn874kEc3IA ➢ https://www.youtube.com/watch?v=5XkK88VEILk				
31-40	**T1:8.2,8.3,8.4** **T2:5.1,5.2,5.4,5.8,5.9**	**Module 4:** Dynamic Programming: General method with Examples, Multistage Graphs Transitive Closure: Warshall's Algorithm, All Pairs Shortest Paths: Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem Bellman-Ford Algorithm Travelling Sales Person problem Reliability design.	Chalk and Talk Video Lectures for some topics	20
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=dN_gQYo9Uf8 ➢ https://www.youtube.com/watch?v=hvDx7q6vcWM				
41-52	**T1: 12.1,12.2** **T2: 7.1,7.4,7.5,8.2,11.1**	**Module 5:** Backtracking: General method, N-Queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles. Branch and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem, LC Branch and Bound solution FIFO, Branch and Bound solution NP-Complete and NP-Hard problems: Basic concepts, non-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.	Chalk and Talk	10

Links to some useful online lectures:

- https://www.youtube.com/watch?v=lTPIX2Ywo3U

Text Books	
1	Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 2rd Edition, 2009. Pearson.
2	Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press
Reference Books	
4.	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI
5.	Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education)

Syllabus for Internal Assessment Tests (IAT*)

IAT #	Syllabus
IAT-1	Class # 1-20
IAT-2	Class # 21-36
IAT-3	Class # 37-52

*See calendar of events for IAT schedule.

Course Outcomes
By the end of this course, students will be able to
Describe computational solution to well known problems like searching, sorting etc.
Estimate the computational complexity of different algorithms.
Devise an algorithm using appropriate design strategies for problem solving.
Identify various approaches for problem solving like Backtracking, Divide & Conquer etc.
Distinguish various classes for problem like P, NP, NP-Complete and NP.

**Based on table 01, 02, 03 in appendix, following are the Course outcomes.

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Describe computational solution to well known problems like searching, sorting etc.	**1,2**	2	-	1	-	-	-	-	-	-	1	1	2	2	-	-	-
CO2	Estimate the computational complexity of different algorithms.	**1,2**	-	1	-	2	-	-	-	-	-	1	-	1	1	-	-	-
CO3	Devise an algorithm using appropriate design strategies for problem solving.	**2,3,4, 5**	-	-	3	-	-	1	-	-	-	-	2	2	2	1	-	-
CO4	Identify various approaches for problem solving like Backtracking, Divide & Conquer etc.	**2,3,4, 5**	1	2	-	2	1	-	-	-	-	-	-	1	1	-	-	-
CO5	Distinguish various classes for problem like P, NP, NP-Complete and NP.	**5**	1	1	1	2	-	-	-	-	-	-	-	-	1	-	-	-

Note: Assignments, study material, Question bank and other course related content would be posted on -site mentioned above.

Appendix

Table 01: Cognitive Levels

Cognitive Levels	
Cognitive level	**Revised Blooms Taxonomy Keywords**
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

Table 02: Program Outcomes (PO) and Program Specific Outcomes (PSO)

Program Outcomes (PO), Program Specific Outcomes (PSO)	
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Design, implement and maintain business applications in a variety of languages using libraries and frameworks.
PSO2	Develop and simulate wired and wireless network protocols for various network applications using modern tools.
PSO3	Apply the knowledge of software and design of hardware to develop embedded systems for real world applications.
PSO4	Apply knowledge of web programming and design to develop web based applications using database and other technologies

Table 03: Correlation Levels

Correlation Levels	
0	No Correlation
1	Slight/Low
2	Moderate/ Medium
3	Substantial/ High

CMR Institute of Technology, Bangalore			
Department(s): Computer Science & Engineering			
Semester: 04	Section(s): A,B&C		
Microprocessor and Microcontroller		**Code: 15CS44**	Lectures/week: 4L+1T
Course Instructor(s): Preethi & Riya			
Course duration: 01 Feb 2018 – 25 May 2018			

Course Objectives
➢ Familiarize with the application of microprocessor and microcontroller ➢ Exposure to the architecture of 8086 microprocessor and ARM processor ➢ Familiarize with the instruction set of 8086 and ARM processor
Prerequisites
➢ Basic programming ability ➢ Familiarity with different number systems, Flip-flops and Memory elements ➢ Basic concepts on Computer organization and Architecture

LESSON PLAN

Lecture #	Book & Sections	Topics	Portions coverage	
			Teaching Aids	% of Syllabus Covered
1- 13	**Text book 1 : Ch 1: 1.1 to 1.7,** Ch 2: 2.1 to 2.7	**The x86 microprocessor:** Brief history of the x86 family, Inside the 8088/86,Introduction to assembly programming, Introduction to Program Segments, The Stack, Flag register, x86 Addressing Modes. **Assembly language programming:** Directives & a Sample Program, Assemble, Link & Run a program, More Sample programs, Control Transfer Instructions, Data Types and Data Definition, Full Segment Definition, Flowcharts and Pseudo code.	Chalk and Talk Video Lectures for some topics	20

Links

- https://onlinecourses.nptel.ac.in/noc18_ec03

➢ **https://www.youtube.com/watch?v=QJLwRsVJsAM** ➢ **https://www.youtube.com/watch?v=0U-hURf8f5c** ➢ https://www.youtube.com/watch?v=De8D-v0DYE8				
14-23	Text book 1: Ch 3: 3.1 to 3.5, Ch 4: 4.1 , 4.2 Chapter 14: 14.1 and 14.2	**x86:** Instructions sets description**, Arithmetic and logic instructions and programs:** Unsigned Addition and Subtraction, Unsigned Multiplication and Division, LogicInstructions, BCD and ASCII conversion, Rotate Instructions. **INT 21H and INT 10H Programming:** Bios INT 10H Programming, DOS Interrupt 21H. 8088/86 Interrupts, x86 PC and Interrupt Assignment.	Chalk and Talk Video Lectures for some topics	20
Links to some useful online lectures: ➢ **https://www.youtube.com/watch?v=5JDoHNqABdc** ➢ **http://www.electronics.dit.ie/staff/tscarff/8086_instruction_set/8086_instruction_set.html** ➢ **https://www.youtube.com/watch?v=Dx4CLaxSaaE** ➢ **https://www.youtube.com/watch?v=4IgDeeLluGw**				
24-35	Text book 1: Ch 6: 6.1, 6.2. Ch 10: 10.2, 10.4, 10.5. Ch 11: 11.1 to 11.4	**Signed Numbers and Strings:** Signed number Arithmetic Operations, String operations. **Memory and Memory interfacing: M**emory address decoding, data integrity in RAM and ROM, 16-bit memory interfacing. **8255 I/O programming:** I/O addresses MAP ofx86 PC's, programming and interfacing the 8255.	Chalk and Talk	20
Links to some useful online lectures: ➢ **https://www.youtube.com/watch?v=YC8B8zmLOc&list=PLlpEm4MNagkzqz6kDfr06GzcAiNOGfZU9&index=4** ➢ **https://www.youtube.com/watch?v=kh2BmpRsFkw&list=PLlpEm4MNagkzqz6kDfr06GzcAiNOGfZU9&index=11**				
36-45	Text book 2:Ch 1:1.1 to 1.4, Ch 2:2.1 to 2.5	Microprocessors versus Microcontrollers, **ARM Embedded Systems :**The RISC design philosophy, The ARM Design	Chalk and Talk Video	20

		Philosophy, Embedded System Hardware, Embedded System Software, **ARM Processor Fundamentals :** Registers , Current Program Status Register , Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions	Lectures for some topics	
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=8dljs0wt4V4 ➢ https://www.youtube.com/watch?v=7LqPJGnBPMM ➢ https://www.youtube.com/watch?v=w6i1bvgdiwY ➢ https://www.youtube.com/watch?v=WYY8rYMJRMY				
46-57	**Text book 2: Ch 3:3.1 to 3.6 (Excluding 3.5.2)**	**Introduction to the ARM Instruction Set :** Data Processing Instructions , Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants, Simple programming exercises.	Chalk and Talk	20
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=J414y1RnfII ➢ https://www.youtube.com/watch?v=7LqPJGnBPMM				

- **Syllabus for Internal Assessment Test**

Internal Assessment Test	Syllabus
IAT1	Class # 01 – 23
IAT2	Class # 24 – 45
IAT3 (Improvement Exam)	Class # 46-57, some important topics from IAT1 and/or IAT2

*See calendar of events for IAT schedule.

Course Outcomes
By the end of this course, students will be able to
1. Explain the architecture and operation of 8086 microprocessor.
2. Demonstrate instructions of 8086 microprocessor using assembly level programs.
3. Explain Interfacing of 8086 with memory and peripherals.
4. Understand internal architecture of ARM and its instruction set.

****Based on table 01, 02, 03 in appendix, following is the CO-PO & CO-PSO mapping**

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Explain the architecture and operation of 8086 microprocessor.	**1,2**	3	1	-	-	-	-	-	-	-	1	-	-	1	-	3	-
CO2	Demonstrate instructions of 8086 microprocessor using assembly level programs	**1,2**	3	1	-	-	-	-	-	-	-	1	-	-	1	-	3	-
CO3	Explain Interfacing of 8086 with memory and peripherals.	**3**	3	1	-	-	-	-	-	-	-	1	-	1	1	-	3	-
CO4	Understand internal architecture of ARM and its instruction set.	**4,5**	3	1	-	-	-	-	-	-	-	1	-	1	1	-	3	-

Literature:

Book Type	Code	Author & Title	Publication info	
			Edition&Publisher	**ISBN #**
TEXT BOOK	TB1	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Danny Causey, The x86 PC Assembly Language Design and Interfacing,	5th Edition, Pearson, 2013.	978-81-317-3441-4
TEXT BOOK	TB2	**ARM system developers guide**, Andrew N Sloss, Dominic Symes and Chris Wright,	Elsevier,Morgan Kaufman publishers, 2008.	
REFERANCE BOOK	RF1	Douglas V. Hall, 'Microprocessors and interfacing'	Tata McGraw-Hill	0-07-060167
REFERANCE BOOK	RF2	K. Udaya Kumar & B.S. Umashankar : Advanced Microprocessors & IBM-PC Assembly Language Programming	TMH 2003.	

Appendix

Table 01: Cognitive Levels

Cognitive Levels	
Cognitive level	**Revised Blooms Taxonomy Keywords**
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L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
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Table 02: Program Outcomes (PO) and Program Specific Outcomes (PSO)

Program Outcomes (PO), Program Specific Outcomes (PSO)	
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PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and

	norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Design, implement and maintain business applications in a variety of languages using libraries and frameworks.
PSO2	Develop and simulate wired and wireless network protocols for various network applications using modern tools.
PSO3	Apply the knowledge of software and design of hardware to develop embedded systems for real world applications.
PSO4	Apply knowledge of web programming and design to develop web based applications using database and other technologies

Table 03: Correlation Levels

Correlation Levels	
0	No Correlation
1	Slight/Low
2	Moderate/ Medium
3	Substantial/ High

CMR Institute of Technology, Bangalore		
Department(s): Computer Science & Engineering		
Semester: 04	Section(s): A	Lectures/week: 04
Subject: OBJECT ORIENTED CONCEPTS		Code: 15CS45
Course Instructor(s): Chaitramani S		
Course duration: 05 FEB 2018 – 25 May 2018		
Course Site:		

Course Objectives

- Explain the Object Oriented concepts
- Explain basic concepts Classes, Objects ,Constructor etc
- Implement inheritance, interfaces and exception in java
- Implement Multi threaded programming and event handling in java
- Develop computer programs to solve real world problems in java
- Develop GUI interfaces using Applet and swings

Prerequisites

- Basic Knowledge of any Programming Language.
- Knowledge of any Object Oriented Programming language(C++,C#)

Lesson Plan				
Lecture #	**Book & Sections**	**Topics**	**Portions coverage**	
			Teaching Aids	% of Syllabus Covered
1-10	TB2: Ch:1 Ch: 2 Ch:3 Ch:4 Ch:5	**Module 2:** **Introduction to Java**: Java's magic: the Byte code; Java Development Kit (JDK); the Java Buzzwords, Object-oriented programming; Simple Java programs. Data types, variables and arrays, Operators, Control Statements	Chalk and Talk Video Lectures for some topics	
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=Y5iUfodednY ➢ https://www.youtube.com/watch?v=P1WcKEgvRFE				
11-21	TB2:Ch:6 Ch: 8	**Module 3:** **Classes, Inheritance, Exceptions, Packages and**	Chalk and Talk	

	Ch:9 Ch:10	**Interfaces**: Classes: Classes fundamentals; Declaring objects; Constructors, this keyword, garbage collection. Inheritance: inheritance basics, using super, creating multi level hierarchy, method overriding. Exception handling: Exception handling in Java. Packages, Access Protection, Importing Packages, Interfaces.	Video Lectures for some topics	
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=UnaNQgzw4zY ➢ https://www.youtube.com/watch?v=Uq6l6J3P_Tg				
22-28	TB2:Ch 11: Ch: 22	**Module 4:** **Multi Threaded Programming, Event Handling**: Multi Threaded Programming: What are threads? How to make the classes threadable ; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, readwrite problem, producer consumer problems.	Chalk and Talk Video Lectures for some topics	
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=O_Ojfq-OIpM ➢ https://www.youtube.com/watch?v=L95658yXRgI				
29-36	TB1: Ch 1: 1.1 to 1.9 Ch 2: 2.1 to 2.6 Ch 4: 4.1 to 4.2	**Module 1:** **Introduction to Object Oriented Concepts**: A Review of structures, Procedure–Oriented Programming system, Object Oriented Programming System, Comparison of Object Oriented Language with C, Console I/O, variables and reference variables, Function Prototyping, Function Overloading. Class and Objects: Introduction, member functions and data, objects and functions, objects and arrays, Namespaces, Nested classes, Constructors, Destructors	Chalk and Talk Video Lectures for some topics	
Links to some useful online lectures: ➢ http://www.pvtuts.com/cpp/cpp-introduction ➢ https://www.youtube.com/watch?v=5T60vZLbuY8				
37-41	TB2:Ch 11: Ch: 22	**Module 4:** **Event Handling**: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Eventlistener interfaces; Using the delegation event model; Adapter classes; Inner classes.	Chalk and Talk Video Lectures for some topics	
Links to some useful online lectures: ➢ https://www.youtube.com/watch?v=STD-ul4qvdM ➢ https://www.youtube.com/watch?v=aabDUD21--k				
41-52	TB2:Ch:1	**Module 5:** **The Applet Class**: Introduction, Two types of Applets;	Chalk	

	Ch: 2 Ch:3 Ch:4 Ch:5	Applet basics; AppletArchitecture; An Applet skeleton; Simple Applet display methods; Requesting repainting;Using the Status Window; The HTML APPLET tag; Passing parameters to Applets;getDocumentbase() and getCodebase(); ApletContext and showDocument(); TheAudioClip Interface; The AppletStub Interface;Output to the Console. Swings: Swings:The origins of Swing; Two key Swing features; Components and Containers; The SwingPackages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon;JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox	and Talk Video Lectures for some topics	

Links to some useful online lectures:

- https://www.youtube.com/watch?v=NuzHaIgcTEg
- https://www.youtube.com/watch?v=aKhUvv7zhuI

Text Books	
1.	Sourav Sahay, Object Oriented Programming with C++, Oxford University Press,2006
2.	Herbert Schildt, Java The Complete Reference, Tata McGraw Hill, 2007. 7th Edition
Reference Books	
5.	Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008
6.	Herbert Schildt, The Complete Reference C++,4th Edition, Tata McGraw Hill,2003
7.	Stanley B.Lippmann, Josee Lajore, C++ Primer, 4th Edition, Pearson Education, 2005
8.	Rajkumar Buyya,S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
9.	Richard A Johnson, Introduction to Java Programming and OOAD, CENGAGE Learning.
10.	E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

Syllabus for Internal Assessment Tests (IAT*)

IAT #	Syllabus
IAT-1	Class # 01 – 20
IAT-2	Class # 22–36
IAT-3	Class # 37–52

*See calendar of events for IAT schedule.

Course Outcomes
By the end of this course, students will be able to
1. Able to explain the Object-Oriented concepts and JAVA.
2. Able to explain the Basic concepts such as class, objects, constructor etc
3. Able to implement concepts Inheritance, Multithreading, exception etc
4. Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using Applets and swings
5. Develop computer programs to solve real world problems in Java

**Based on table 01, 02, 03 in appendix, following are the Course outcomes.

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Explain the Object Oriented Concepts	**1,2**	2	1	2	-	1	-	-	-	-	-	1	-	2	-	-	-
CO2	Explain basic concepts Classes, Objects ,Constructor	**1,2**	2	1	2	-	1	-	-	-	-	-	1	1	2	1	-	-
CO3	Implement inheritance, interfaces and exception in java	**2,3,4**	2	1	2	-	1	-	-	-	-	-	-	-	1	1	-	-
CO4	Implement Multi threaded programming and event handling in java	**2,4**	2	1	2	-	1	-	-	-	-	-	-	-	2	-	-	2
CO5	Develop computer programs to solve real world problems in java	**2,3,4**	2	1	2	1	1	-	-	-	1	-	-	-	2	2	1	-
CO6	Develop GUI interfaces using Applet and swings	**2,5**	2	1	2	1	1	-	-	-	1	1	-	-	2	-	-	2

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CMR Institute of Technology, Bangalore			
Department(s): Computer Science & Engineering			
Semester: 04	Section(s): A,B&C		
Data Communication		15CS46	Lectures/week: 04
Course Instructor(s): Mrs Shanthi M.B/Ms. Savitha.S			
Course duration: 05 Jan., 2018 – 25 May 2018			

Course Objectives

- Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Explain with the basics of data communication and various types of computer networks;
- Illustrate TCP/IP protocol suite and switching criteria.
- Demonstrate Medium Access Control protocols for reliable and noisy channels.
- Expose wireless and wired LANs along with IP version.

Prerequisites

- Basic understanding of Computer.
- Basics of probability theory.
- A strong understanding of binary numbers, bits and bytes, and knowledge of how computers lay

out data in memory.

LESSON PLAN

Lecture #	Book & Sections	Topics	Portions coverage: Teaching Aids	Portions coverage: % of Syllabus Covered
1-12	TB1: - 1.1-1.5, 2.1-2.3,3.1-3.6,4.1	**Module-1** **Introduction:** Data Communications, Networks, Network Types, Internet History, Standards and Administration, **Networks Models**: Protocol Layering, TCP/IP Protocol suite, The OSI model, **Introduction to Physical Layer-1:** Data and Signals**,** Digital Signals, Transmission Impairment, Data Rate limits, Performance, **Digital Transmission**: Digital to digital conversion (Only Line coding: Polar, Bipolar and Manchester coding).	Chalk and Talk Video Lectures for some topics	20

Links to some useful online lectures:

- https://www.youtube.com/watch?v=9hIQjrMHTv4
- https://www.youtube.com/watch?v=YGYTAnt4W-I
- https://www.youtube.com/watch?v=u-2fogDkl78
- https://www.youtube.com/watch?v=vyGhv3_Iz60
- https://www.youtube.com/watch?v=bScqF-GMNd0
- https://www.youtube.com/watch?v=rStveoU1xQo

13-22	TB1 4.2 - 4.3,5.1,6.1-6.2,8.1-8.3	**Module 2** **Physical Layer-2:** Analog to digital conversion (only PCM), Transmission Modes, **Analog Transmission**: Digital to analog conversion, **Bandwidth Utilization**: Multiplexing and Spread Spectrum, **Switching**: Introduction, Circuit Switched Networks and Packet switching.	Chalk and Talk Video Lectures for some topics	40

Links to some useful online lectures:

- https://www.youtube.com/watch?v=-FBs7xFOzA4

- https://www.youtube.com/watch?v=67Rl1pGeS2A
- https://www.youtube.com/watch?v=hugcOPo-kxA

23-32	TB1 10.1-10.5,11.1-11.4	**Error Detection and Correction**: Introduction, Block coding, Cyclic codes, Checksum, Forward error correction**, Data link control**: DLC services, Data link layer protocols, HDLC, and Point to Point protocol (Framing, Transition phases only). .	Chalk and Talk & Video Lectures for some topics	60

Links to some useful online lectures:

- https://www.youtube.com/watch?v=-FBs7xFOzA4
- https://www.youtube.com/watch?v=67Rl1pGeS2A
- https://www.youtube.com/watch?v=hugcOPo-kxA

33-42	TB1 12.1-12.3,13.1-13.5,15.1-15.3	**Module 4** **Media Access control**: Random Access, Controlled Access and Channelization, **Wired LANs Ethernet**: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet, **Wireless LANs:** Introduction, IEEE 802.11 Project and Bluetooth.	Chalk and Talk Video Lectures for some topics	80

Links to some useful online lectures:

- https://www.youtube.com/watch?v=I3DH5gnC1X4
- https://www.youtube.com/watch?v=HY5VdPhCWi0
- https://www.youtube.com/watch?v=PSewQdOs8T8

43-52	TB1 16.1-16.3,19.1-19.3,22.1-22.4	**Module 5** **Other wireless Networks**: WIMAX, Cellular Telephony, Satellite networks, **Network layer Protocols** : Internet Protocol, ICMPv4,Mobile IP, **Next generation IP**: IPv6 addressing, The IPv6 Protocol, The ICMPv6 Protocol and Transition from IPv4 to IPv6.	Chalk and Talk Video Lectures for some topics	100

Links to some useful online lectures:

- https://www.youtube.com/watch?v=1FA2vHWqa5E
- https://www.youtube.com/watch?v=7DZF8ljp688

- https://www.youtube.com/watch?v=zRnJzvkf5gA

Text Books	
1.	Behrouz A. Forouzan, Data Communications and Networking 5E, 5th Edition, Tata McGraw-Hill,2013.
Reference Books	
1.	Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental Concepts and Key architectures, 2nd Edition Tata McGraw-Hill, 2004
2.	William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007
3.	Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.

Syllabus for Internal Assessment Tests (IAT) *

IAT #	Syllabus
IAT-1	Class # 01 – 24
IAT-2	Class # 25–40
IAT-3	Class # 41–52

* : See calendar of events for the schedules of IATs.

Course Outcomes
By the end of this course, students will be able to
1. Understand and be able to explain the principles, system functions of TCP/IP and OSI layered protocol architecture
2. Understand, explain and calculate digital transmission over various topology and communication medium.
3. Understand, analyze and solve mathematical problems for data-link, medium access control and network protocols.
4. Understand and explain the principles and protocols for routing and its performance calculation
5. Understand and explain subnetting, reliable transmission and performance calculation of TCP connections.

COGNITIVE LEVELS	
Cognitive level	**REVISED BLOOMS TAXONOMY KEYWORDS**
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.

L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

PROGRAM OUTCOMES (PO), PROGRAM SPECIFIC OUTCOMES (PSO)	
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

	effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Implement and maintain enterprise solutions using latest technologies..
PSO2	Develop and simulate wired and wireless network protocols for various network applications using modern tools
PSO3	Apply the knowledge of information technology and software testing to maintain legacy systems.
PSO4	Apply knowledge of web programming and design to develop web based applications using database and other technologies

CORRELATION LEVELS	
0	No Correlation
1	Slight/Low
2	Moderate/ Medium
3	Substantial/ High

Course Outcomes		**Modules covered**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	Understand and be able to explain the principles, system functions of TCP/IP and OSI layered protocol architecture.		1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO2	Understand, explain and calculate digital transmission over various topology and communication medium.		1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Understand, analyze and solve mathematical problems for data-link, medium access control and network protocols		1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Understand and explain the principles and protocols for routing		1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

	and its performance calculation																		
CO5	Understand and explain subnetting, reliable transmission and performance calculation of TCP connections.		-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

Note : From time to time, assignments will be posted on

https://sites.google.com/a/cmrit.ac.in/savitha-s

https://sites.google.com/a/cmrit.ac.in/shanthi-mb