B.M.S. College of Engineering, Bengaluru-19
Autonomous Institute, affiliated to VTU

Department of Computer Science and Engineering
Curriculum Design for UG

UG Scheme from 3rd to 8th Semester
Academic Year of admission 2018-19

Definition of Credit: 1Hr. Lecture (L) per week 1 credit ; 2Hrs Tutorial (T) per week 1 credit ; 2Hrs Practical per week 1 credit

Credit Distribution among Curricular Components

Sem	HS	BS	ES	PC	PE	OE	Proj/Mini Proj	Seminar Technical (SR)	Seminar – Internship (SR)	Non-Credit	Total Credits
I		9	11							A1	**20**
II		9	11							A2	**20**
III	2	4	4	14			2			A3	**26**
IV	1	4		16			2		1	A4	**24**
V	2			15	6		2			A5	**25**
VI	3			12	4	3	2		1	A6	**25**
VII	3	2		1	6	3	3	1		A7	**19**
VIII				2		3	10	1		A8	**16**
Total	**11**	**28**	**26**	**60**	**16**	**9**	**21**	**2**	**2**		**175**

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UG CSE 3rd Semester

Course Type	Code	Course Title	Credits			Total Credits	Total Cont.Hrs	Marks		
			L	**T**	**P**			**CIE**	**SEE**	**Total**
BS-5	19MA3BSSDM	Statistics and Discrete Mathematics	3	1	0	4	5	50	50	100
ES-7	19CS3ESMMC	Microprocessors and Microcontrollers	3	0	1	4	5	50	50	100
PC-1	19CS3PCOOJ	Object Oriented Java Programming	3	0	1	4	5	50	50	100
PC-2	19CS3PCDST	Data Structures	3	0	1	4	5	50	50	100
PC-3	19CS3PCCOA	Computer Organization and Architecture	3	0	0	3	3	50	50	100
PC-4	19CS3PCLOD	Logic Design	2	1	0	3	4	50	50	100
HS-1	19HS3PCEVS / 19HS4PCEVS	Environmental Studies	2	0	0	2	2	50	50	100
PW-1	19CS3PWPW1	Project Work-1	0	0	2	2	2	50	50	100
NC-3	19CS3NCNC3	Physical Activity (Sports/ Yoga Etc.)	Non-credit mandatory Course							
		TOTAL	19	2	5	26	31	400	400	800

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs: Additional Mathematics-I (19MA3IMMAT)

PW-1: Website based Application Development - Only Front End: Under this project work, student should develop front end for the websites of any chosen topic. Students can form a group with minimum of two and maximum of four. Teacher allotted for project work to students should teach students front end web technologies such as HTML, CSS, Java Script and basics of PHP (Sessions/Cookies Management) during Class/Lab hours as per the allotment. Teacher allotted for project work should guide the students in choosing the topic and towards carrying out project work and complete the evaluation of assigned students. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

NC-3: Student can participate in any of the physical activities such as Sports, Marathon, Yoga conducted by college or any organization. Student should produce participation certificate for clearing this mandatory course. Note: If student is unable to participate in outside physical activities then department Head should take care of conducting Yoga and Meditation of one or two day event in the college. Physically challenged students can produce participation certificate of any technical/cultural events conducted by college/department clubs.

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UG CSE 4th Semester											
Course Type	**Code**	**Course Title**	**Credits**			**Total Credits**	**Total Cont.Hrs**	**Marks**		
			L	**T**	**P**			**CIE**	**SEE**	**Total**
BS-6	19MA4BSLIA	Linear Algebra	3	1	0	4	5	50	50	100
PC-5	19CS4PCTFC	Theoretical Foundations of Computations	3	1	0	4	5	50	50	100
PC-6	19CS4PCDBM	Database Management Systems	3	0	1	4	5	50	50	100
PC-7	19CS4PCADA	Analysis and Design of Algorithms	3	0	1	4	5	50	50	100
PC-8	19CS4PCOPS	Operating Systems	3	1	0	4	5	50	50	100
HS-2	19IC3HSCPH/ 19IC4HSCPH	Constitution of India, Professional Ethics and Human Rights	1	0	0	1	1	50	50	100
SR-1	19CS4SRSTI	Seminar Technical / Internship	0	0	1	1	0	50	50	100
PW-2	19CS4PWPW2	Project Work-2	0	0	2	2	2	50	50	100
NC-4	19CS4NCNC4	Cultural Activity (Music/Dance etc.)	Non-credit mandatory Course							
		TOTAL	16	3	5	24	28	400	400	800

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs: Additional Mathematics-II (19MA4IMMAT)

SR-1: Technical Seminar Based on **i.** Summer/Winter Internship (with any NGO or company during mandatory internship of at least one week (at least five days) during the vacation period of 1st, 2nd and 3rd Sem) or **ii.** Research paper presentation based on Technology Trends in Healthcare, Finance etc.

PW-2: Database Application Development **-** Under this project work, student should develop back end database table for any chosen database applications. It can be extension of 3rd sem project with back end connection. Front end can be either Visual basic or Java framework. Tables developed should be more than six database tables. Students can form a group with minimum of two and maximum of four. Teacher allotted for project work to students should teach students back end technologies like Oracle and front end technologies like Visual during Lab hours as per the allotment. Teacher should guide the students in choosing the topic & towards carrying out project work and complete the evaluation of assigned students. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

NC-4: Student can participate in any of the cultural activities such as Music, dance conducted by college or any organization. Student should produce participation certificate for clearing this mandatory course. Note: If student is unable to participate in outside cultural activities then department Head should take care of conducting any small cultural event (like Essay, Debate etc.) of one or two day event in the college. Physically challenged students can produce participation certificate of any technical/cultural events conducted by college/department clubs.

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UG CSE 5th Semester

Course Type	Code	Course Title	Credits			Total Credits	Total Cont.Hrs	Marks		
			L	T	P			CIE	SEE	Total
PC-9	20CS5PCAIP	Artificial Intelligence	3	0	1	4	5	50	50	100
PC-10	20CS5PCCON	Computer Networks	3	0	1	4	5	50	50	100
PC-11	20CS5PCUSP	Unix Shell and System Programming	3	0	1	4	5	50	50	100
PC-12	20CS5PCSEG	Software Engineering	3	0	0	3	3	50	50	100
HS-3	20CS5HSSPM	Software Project Management and Finance	2	0	0	2	2	50	50	100
PE-1	20CS5PEIOT	Internet of Things	2	0	1	3	4	50	50	100
	20CS5PEAJJ	Advanced Java and J2EE								
	20CS5PEADS	Advanced Data Structures								
PE-2	20CS5PEAAG	Advanced Algorithms	3	0	0	3	3	50	50	100
	20CS5PESCD	System Software and Compiler Design								
	20CS5PEACA	Advanced Computer Architecture								
PW-3	20CS5PWPW3	Project Work-3	0	0	2	2	2	50	50	100
NC-5	20CS5NCNC5	Making Videos with Social message	Non-credit mandatory Course							
TOTAL			19	0	6	25	29	400	400	800

PW-3: Advanced Web based Application development or Mobile App Development **-** Under this project work, student should develop Advanced Web based Application development using technologies such as Node JS, React or Mobile App Development using Android or any similar technologies. Students can form a group with minimum of two and maximum of four. Teacher allotted for project work to students should teach students technologies like Node JS, React, Android etc., during Class/Lab hours as per the allotment. Teacher allotted for project work should guide the students in choosing the topic & towards carrying out project work and complete the evaluation of assigned students. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

NC-5: Student should make videos with relevant social message. This has to be uploaded by student on Youtube. Norms of Youtube should be followed by the student to upload video. Student should produce YouTube link with screen shot of the video for clearing this mandatory course.

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UG CSE 6th Semester

Course Type	Code	Course Title	Credits			Total Credits	Total Cont. Hrs.	Marks		
			L	T	P			CIE	SEE	Total
PC-13	20CS6PCMAL	Machine Learning	3	0	1	4	5	50	50	100
PC-14	20CS6PCCNS	Cryptography and Network Security	3	1	0	4	5	50	50	100
PC-15	20CS6PCOMD	Object Oriented Modelling and Design	3	0	1	4	5	50	50	100
HS-4	20CS6HSMGE	Management and Entrepreneurship	3	0	0	3	3	50	50	100
PE-3	20CS6PECGV	Computer Graphics & Visualization	3	0	1	4	5	50	50	100
	20CS6PEBDA	Big Data Analytics								
	20CS6PENLP	Natural Language Processing								
OE-1	20CS6OEJVP	Open Elective-1 : Java Programming	3	0	0	3	3	50	50	100
	20CS6OERPA	Open Elective-2 : Robot Process Automation Design and Development								
PW-4	20CS6PWPW4	Project Work-4	0	0	2	2	2	50	50	100
SR-2	20CS6SRSTI	Seminar on Internship / MOOC course	0	0	1	1	1	50	50	100
NC-6	20CS6NCNC6	Personality Development and Communication Skills or Aptitude Skills	Non-credit mandatory Course							
TOTAL			18	1	6	25	29	400	400	800

Open Elective-1: Students can select any one of the open electives offered by any Department. Selection of an open elective is not allowed provided, **i.** The candidate has studied the same course during the previous semesters of the programme. **ii.** The syllabus content of open elective is similar to that of Departmental core courses or professional electives. **iii.** A similar course, under any category, is prescribed in the higher semesters of the programme. Registration to electives shall be documented under the guidance of Proctor.

PW-4: Data Science or Security based application development- Under this project work, student should develop Data Science or Security based Application development using technologies such as Weka, R tool. Students can form a group with minimum of two and maximum of four. Teacher allotted for project work to students should teach students technologies like Weka, R tool, Kaggle kernels, during Class/Lab hours as per time table allotment. Teacher allotted for project work should guide the students in choosing the topic & towards carrying out project work and complete the evaluation of assigned students. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

SR-2: Technical Seminar Based on **i.** Summer/Winter Internship (with any company the internship should be at least two weeks during the vacation period of 4th and 5th Sem). Internship should be based on Hands-on skills implementation related to Computer technology. OR **ii.** Completion of any one MOOC (Massive Open online course) course through online platforms like NPTEL/SWAYAM/Coursera/Edx etc.(at least 2 weeks) based on Computer Science and Engineering related courses. MOOC should be registered and completed by students during the vacation period of 4th sem or 5th sem.

NC-6: Student should can participate in any Personality Development & Communication (PDC) Skills Programme or any Aptitude test conducted by any organization example GATE. Student should submit participation certificate of PDC/Aptitude for clearing this mandatory course. In case if student is unable to produce the certificate, then department head should take care of conducting aptitude Test or technical test with GATE questions.

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UG CSE 7th Semester

Course Type	Code	Course Title	Credits			Total Credits	Total Cont.Hrs	Marks		
			L	T	P			CIE	SEE	Total
BS-7	21IC7BSBIE	Biology for Engineers	2	0	0	2	2	50	50	100
HS-5	21CS7HSCFI	Cyber Law , Forensics and IPR	3	0	0	3	3	50	50	100
PE-4	21CS7PEBLC	Block Chain	3	0	0	3	3	50	50	100
	21CS7PENSD	NoSQL Database								
	21CS7PEMMC	Multimedia Computing								
PE-5	21CS7PEDIS	Distributed Systems	3	0	0	3	3	50	50	100
	21CS7PESDP	Software Architecture and Design Patterns								
	21CS7PECCT	Cloud Computing								
OE-2	21CS7OEDAS	Open Elective-1 : Data Science	3	0	0	3	3	50	50	100
	21CS7OEPYP	Open Elective-2 : Python Programming								
PC-17	21CS7PCIMC	Industry Motivated Course	1	0	0	1	1	50	50	100
PW-5	21CS7PWPP1	Major Project Phase-1	0	0	3	3	0	50	50	100
SR-3	21CS7SRSEM	Technical Seminar (Based on review of Research Publication/ Patent)	0	0	1	1	0	50	50	100
NC-7	21CS7NCNC7	MOOC Course / Virtual lab	Non-credit mandatory Course							
		TOTAL	15	0	4	19	15	400	400	800

Open Elective-2: Students can select any one of the open electives offered by any Department. Selection of an open elective is not allowed provided, **i.** The candidate has studied the same course during the previous semesters of the programme. **ii.** The syllabus content of open elective is similar to that of Departmental core courses or professional electives. **iii.** A similar course, under any category, is prescribed in the higher semesters of the programme. Registration to electives shall be documented under the guidance of Proctor.

Major Project Phase-1: Students can form a group with minimum of two and maximum of four. Under the allotted guide, student group should choose the Project title. For the chosen project title, the student group should carry out detailed literature Survey, Problem Formulation, Planning and High Level Design. CIE evaluation will be based on committee constitute, one of whom shall be the Guide. Committee constitution will be by HOD and UG project coordinator. CIE evaluation will be as per the rubrics set by the department. Rubrics design will be by HOD, UG project coordinator, One professor, One Associate professor and One Assistant Professor. Project Guide should guide the student group towards carrying out project work.

SR-3: Technical Seminar Based on **i.** Research paper presentation based on review of Research Publications or Patent. **ii.** Research papers chosen should be at least from an IEEE conference, Springer Journal, Elsevier Journal **iii.** Research paper should be an computer field related research work

NC-7: Student should can register in any of the computer field related courses or virtual labs online through NPTEL, Coursera, Edx, Udacity etc., (at least Free course of two weeks. Note: Department will not take care of reimbursement of paid courses). Student should submit certificate (or screen shot) from the registered online platforms (i.e., NPTEL, Coursera, Edx, Udacity etc.). The certificate or the screenshot should indicate that student has cleared the online course.

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UG CSE 8th Semester

Course Type	Code	Course Title	Credits			Total Credits	Total Cont.hrs	Marks		
			L	T	P			CIE	SEE	Total
PC-18	21CS8PCGCT	Green Computing	2	0	0	2	2	50	50	100
OE-3	21CS8OECCT	*Open Elective-1:* Cloud Computing	3	0	0	3	3	50	50	100
	21CS8OEBDA	*Open Elective-2:* Big Data Analytics								
PW-5	21CS8PWPP2	Major Project Phase-2	0	0	10	10	0	50	50	100
SR-4	21CS8SRINT	Seminar Based on Summer/Winter Internship with a government organization or any other organization or a premier Institute or a Research Lab	0	0	1	1	0	50	50	100
NC-8	21CS8NCNC8	Any Competitive Examination or MOOC Course.	Non-credit mandatory Course							
TOTAL			5	0	11	16	5	200	200	400

Open Elective-3: Students can select any one of the open electives offered by any Department. Selection of an open elective is not allowed provided, **i.** The candidate has studied the same course during the previous semesters of the programme. **ii.** The syllabus content of open elective is similar to that of Departmental core courses or professional electives. **iii.** A similar course, under any category, is prescribed in the higher semesters of the programme. Registration to electives shall be documented under the guidance of Proctor.

Major Project Phase-2: This is an extension of Major Project Phase-1 carried out during 7th sem. For the chosen project title, the student group should carry out detailed Design, Implementation and demonstration of the project work. CIE evaluation will be based on committee constitute, one of whom shall be the Guide. Committee constitution will be by HOD and UG project coordinator. CIE evaluation will be as per the rubrics set by the department. Rubrics design will be by HOD, UG project coordinator, One professor, One Associate professor and One Assistant Professor. Project Guide should guide the student group towards carrying out project work.

SR-2: Technical Seminar Based on **i.** Summer/Winter Internship (with any company, the internship should be at least two months during the vacation periods of 6th , 7th Sem or during 8th Sem **ii.** Internship should be based on Hands-on skills related to Computer technology

NC-6: Student should can take up any competitive exams like GATE, TOFEL, GRE etc., or MOOC course. Note: MOOC course taken up during 7th Sem should not be repeated i.e., it should be different. For clearing this Non-Credit course. i. For Competitive exam, the student should submit the passing scored card or ii. For MOOC course, student should submit certificate (or screen shot) from the registered online platforms (i.e., NPTEL, Coursera, Edx, Udacity etc.). The certificate or the screenshot should indicate that student has cleared the online course.

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Department of Computer Science and Engineering
Curriculum Design for UG

Academic Year of admission 2018-19

UG Syllabus from 3rd to 4th Semester

Definition of Credit: 1Hr. Lecture (L) per week 1 credit; 2Hrs Tutorial (T) per week 1 credit; 2Hrs Practical per week 1 credit

THIRD SEMESTER B.E COURSE (CSE/ISE)

Course Title	Statistics and Discrete Mathematics	Course Code	19MA3BSSDM
Credits	04	L – T – P	3 – 1 – 0
Contact h o u r s	48 hours (36L+12T)		

Prerequisites: Basic Concepts of Probability and Statistics.

Course Objectives: To acquaint the student with various concepts of discrete mathematics, Probability, Statistics and Queuing required in several streams of Computer/Information Science.

UNIT-1

GRAPH THEORY [11 hours]

Basic concepts: Types of graphs, order and size of a graph, in-degree and out-degree, connected and disconnected graphs, Eulerian graph, Hamiltonian graphs, sub-graphs, isomorphic graphs. Matrix representation of graphs: adjacency matrix, incidence matrix. Trees: spanning tree, minimal spanning tree: Kruskal's algorithm, Prim's algorithm, shortest path-Dijkstra's algorithm.

(8L+3T)

UNIT-2

COMBINATORICS [9 hours]

Principles of counting: The rules of sum and product, permutations. Combinations- Binomial and multinomial theorems. Catalan numbers, the principle of inclusion and exclusion. Derangements.

(7L+2T)

UNIT-3

PROBABILITY [8 hours]

Theoretical distributions: Poisson distribution, Exponential and Normal distributions. Joint probability distributions: Discrete random variable, Mathematical expectations, Covariance and Correlation.

(6L+2T)

UNIT-4

STATISTICAL INFERENCE [11 hours]

Introduction, procedure for testing of hypothesis, level of significance. [Large sample] Test of significance for single mean, difference between two means, single proportion, difference between two proportions.
[Small sample] Test of significance for single mean, difference between two means, paired t-test, ratio of variances (F- distribution), Chi-Square distribution-goodness of fit.

(8L+3T)

MARKOV CHAIN AND QUEUING THEORY [9 hours]

Markov Chain, Probability vectors, stochastic matrices, fixed point vector, regular stochastic matrices. Higher transition probabilities, stationary distribution of regular Markov chains. Queuing models: Concept of Queue, M/M/1 queuing systems.

(7L+2T)

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DEPARTMENT OF CSE

On completion of the course student will have the ability to:

Course Code	CO #	COURSE OUTCOMES (CO)	PO
19MA3BSSDM	CO 1	Use graphs as representation tool in network analysis	1
	CO 2	Demonstrate an understanding of the basic concepts of Combinatorics.	
	CO 3	Apply the concepts for probability, Statistics and Queuing theory.	

Text Books:
1. Discrete Mathematics, Seymour Lipchitz. M. Lipson, 2005, Tata McGraw Hill.
2. Graph Theory and Combinatorics, D. S. Chandrasekharaiah, 4th edition, 2011-12, Prism Engineering Education Series.
3. Higher Engineering Mathematics, B. V. Ramana, 2007, Tata McGraw Hill.

Reference Books:
1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 2002, McGraw Hill.
2. Discrete Mathematics, Kolman, Busby Ross, 5th edition, 2004, Prentice Hall.
3. Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Eastern Economy Edition, PHI Learning Pvt., Ltd.

E books and online course materials:
1. http://jlmartin.faculty.ku.edu/~jlmartin/courses/math725-S16/
2. https://www.whitman.edu/mathematics/cgt_online/cgt.pdf

Online Courses and Video Lectures:
1. https://www.coursera.org/learn/probability-intro
2. https://nptel.ac.in/courses/111104026/ (Discrete Mathematics)
3. https://nptel.ac.in/courses/111106086/ (Combinatorics)
4. https://nptel.ac.in/courses/111102112/ (Statistical Inference)

Question Paper Pattern:
1. Five full questions to be answered.
2. To set one question in Units 2, 3, 5 and two questions each in unit 1 and unit 4.

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Sem	3rd		
Course Title:	**Microprocessors and Microcontrollers**		
Course Code:	**19CS3ESMMC**		
L-T-P:	3-0-1	Total Credits:	4

A **Syllabus**

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Introduction to 8086 Microprocessor, Internal Architecture, Register Organisation, Flag register, Addressing Modes, Assembler directives, Instruction set of 8086 – Data Transfer instructions, Logical instructions, Arithmetic instructions, Example programs, Branch instructions, Loop instructions.	8 Hrs	Text Book-1: 1.1, 1.2, 2.2, 2.4, 2.3
2	Machine control instructions, Flag manipulation instructions, Shift and rotate instructions, Delay Loops, String instructions, Assembly language programming examples Instruction Templates, MOV instruction Coding Format and Examples, Special Architectural Features and related programming: Stacks, Procedures, Macros, Interrupts and the Vector Table	7 Hrs	Text Book-1: 2.3, 3.2, 4.1-4.7
3	Pin Diagram of 8086, Maximum/ Minimum Mode of 8086, Timing Diagram, Methods of interfacing I/O devices, Programmable Peripheral interface 8255, Interfacing of Logic controller, Interfacing of Seven segment display	8 Hrs	Text Book-1: 1.8, 1.9, 5.3, 5.4, 5.5
4	Microprocessors versus Microcontrollers, 8051 Architecture: Introduction, 8051 Microcontroller Hardware, Input/ Output Pins, External Memory Interface, Addressing Modes and Instruction set. Example Demonstration using 8051 instruction set, Data transfer instructions, Arithmetic instructions.	9 Hrs	Text Book-2: Page No. 2 to 4, 11-28, 45-54, 71-82,
5	8051 instruction set: Logical instructions, Branching and Subroutines, Example programs. Interfacing with 8051: LCD Interfacing, Keyboard Interfacing, Seven segment display, Stepper Motor, Elevator	7 Hrs	Text Book-2: Page No. 59-68, 86-95. Text Book-3: 12.1 and 12.2, 17.2

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Microprocessor and peripherals	A K Ray and K M Bhurchandi.	3rd edition	Tata McGraw-Hill Education, 2006	2012
2.	The 8051 Microcontroller Architecture, Programming & Applications".	Kenneth J. Ayala	2nd Edition	Penram International Publishing	2005
3	8051 Microcontroller and Embedded Systems- using Assembly and C	Mohammed Ali mazidi , Janice Gillispie mazidi and rolim d mcKinley	2nd Edition	Pearson Education Limited	2012

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Microprocessors and IBM - Pc Assembly Language Programming	Udaya Kumar and B. Uma shankar	1st Edition	McGraw Hill Education	July 2017
2.	Microprocessor and Microcontroller	Soumitra Kumar Mandal	1St Edition	McGraw Hill Education	2011

E-Book						
Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Microcomputer System The 8086/8088 Family	Yu-Cheng Liu and Glenn A Gibson	2nd Edition	PHI	2009	https://drive.google.co/drive/folders/0B1yKJzk_EV46N2pWLXB4bExzSE0

MOOC Course				
Sl. No.	Course name	Course Offered By	Year	URL
1.	Microprocessors and Microcontrollers	NPTEL		(https://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/notused/Microprocessors%20and%20Microcontrollers-/Learning%20Material%20-%20Microprocessors%20and%20microcontrollers.pdf)

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** the knowledge of architecture, instruction set and assembly language programming of microprocessor and microcontroller.
CO2	Ability to **analyze** the attributes of Microprocessors & Microcontrollers to address the given problem
CO3	Ability to **design** microprocessor and microcontroller based systems
CO4	Ability to **conduct** experiments using assembly language programming to **demonstrate** the features of microprocessor and microcontroller.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3														
CO2		3													
CO3			2											2	
CO4				3	2										

D   Proposed Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	---	20
QUIZ	---	5
Lab Component	---	25
Alternate Assessment Tool	----	---
Total		50

E   Tutorial Plan *(if applicable):*

F **Laboratory Plan** *(if applicable)*

Lab Program	Unit#	Program Details
		Assembly level Programs using 8086
1	1,2	Design and develop an assembly language program to search a key element "X" in a list of 'n' 16-bit numbers. Adopt Binary search algorithm in your program for searching.
2	1,2	Design and develop an assembly program to sort a given set of 'n' 16-bit numbers in ascending order. Adopt Bubble Sort algorithm to sort given elements.
3	1,2	Read an alphanumeric character and display its equivalent ASCII code at the center of the screen.
4	1,2	Reverse a given string and check whether it is a palindrome or not.
5	1,2	Read two strings, store them in locations STR1 and STR2. Check whether they are equal or not and display appropriate messages. Also display the length of the stored strings.
6	1,2	Develop an assembly language program to compute nCr using recursive procedure. Assume that 'n' and 'r' are non-negative integers
7	1,2	Read the current time from the system and display it in the standard format on the screen
8	1,2	Write a program to simulate a Decimal Up-counter to display 00-99.
9	1,2	Read a pair of input co-ordinates in BCD and move the cursor to the specified location on the screen.
10	1,2	Write a program to create a file (input file) and to delete an existing file
		Interfacing Programs Using 8051
11	4,5	Read the status of eight input bits from the Logic Controller Interface and display 'FF' if it is the parity of the input read is even; otherwise display 00.
12	4,5	Implement a BCD Up-Down Counter on the Logic Controller Interface.
13	4,5	Scan a 8 x 3 keypad for key closure and to store the code of the key pressed in a memory location or display on screen. Also display row and column numbers of the key pressed.
14	4,5	Drive a Stepper Motor interface to rotate the motor in specified direction (clockwise or counter-clockwise) by N steps. Introduce suitable delay between successive steps.
15	4,5	Display messages FIRE and HELP alternately with flickering effects on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages
16	4,5	Convert a 16-bit binary value (assumed to be an unsigned integer) to BCD and display it from left to right and right to left for specified number of times on a 7-segment display interface
17	4,5	Drive an elevator interface in the following way: **i.** Initially the elevator should be in the ground floor, with all requests in OFF state. **ii.** When a request is made from a floor, the elevator should move to that floor, wait there for a couple of seconds (approximately), and then come down to ground floor and stop. If some requests occur during going up or coming down they should be ignored.

G **Alternate Assessment Tool Plan** *(if applicable):NA*

H **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	50%
Create / Evaluate	25%

Sem	3rd		
Course Title:	Data Structures		
Course Code:	19CS3PCDST		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Basic concepts:** Structures, Pointers and dynamic memory allocation. **Stack**: Definition and examples, Representation of stacks in C **Applications of Stack**: Converting an expression from Infix to postfix and Evaluation of Expression. Recursion: Factorial, Fibonacci Sequence, Tower of Hanoi	9	Textbook1 Chapter 1: 1.4 Chapter 2: 2.3 Chapter 1: 1.2 Textbook2 Chapter 2: 2.1, 2.2, 2.3 Chapter 3: 3.2, 3.3
2	**Queues**: The queue and its sequential representation, Linear queue, Circular Queues, Double Ended Queue, Priority Queues.	8	Textbook1: 3.3 Textbook 2 Chapter 4: 4.1
3	**Linked Lists**: Linked list, Array implementation of Lists, Limitations of the array implementation, Allocating and freeing dynamic variables, Linked list using dynamic variables. Operations on singly linked list: Insert, Delete, Display, Concatenate, Search, Merge, Sort, Reverse. Linked list: Linked Stacks and Queues	7	Textbook 2: Chapter 4: 4.2 Textbook 1: Chapter 4: 4.4
4	**Circular lists and it's basic operations**: Insert, Delete and Display. **Doubly linked lists and it's basic operations:** Insert, Delete and Display. **Applications of linked lists:** Addition of long positive integers using circular list, Adding Polynomials**.** **Hashing:** Hash tables, Hash function, Overflow handling: Open Addressing, Chaining	7	Textbook1 Chapter 5: 5.1, 5.2, 5.3, 5.7
5	**Trees**: Introduction, Representation of trees, Binary Tree, Properties of Binary Trees, Binary tree representation- Binary tree traversals, Binary Search Tree(BST): Definition, Searching a BST, Inserting into BST, deletion from BST	8	Textbook1 Chapter 10: 10.2, 10.4 Chapter 5: 5.5 Chapter 8: 8.2

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Data Structures in C	Horowitz, Sahni, Anderson Freed	Second	Universities Press	2008
2.	Data Structures using C	Aaron M.Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein	Fifth	Pearson education	2007

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Data structures and program design in C	Robert L. Kruse, Clovis L. Tondo, Bruce P. Leung	Second	Prentice Hal	1997
2	Data Structure using C	A.M Padma Reddy	Thirteenth edition	Sri Nandi	2013

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Data Structures using C	Reema Thareja	Second Edition	Oxford Univsersity press	2014	https://www.academia.edu/28758384/ Data_structures_using_c_2nd_reema_thareja

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Data Structures	Coursera		https://www.coursera.org/learn/data-structures
2.	Data Structures and algorithms	NPTEL		https://nptel.ac.in/courses/106102064/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Apply the concept of linear and nonlinear data structures to various applications
CO2	Analyse the usage of appropriate data structure for a given application
CO3	Design and implement operations of linear and nonlinear data structure
CO4	Ability to conduct practical experiments for demonstrating the operations of different data structures.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1														
CO2		2													
CO3			3												
CO4			3		3										3

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	---	20
Quiz/AAT	---	5
Lab Component	---	25
Total		50

E   Tutorial Plan *(if applicable)*

F **Laboratory Plan** *(if applicable)*

Lab Program	Unit #	Program Details
1	**1**	Write a program to simulate the working of stack using an array with the following : a) Push b) Pop c) Display The program should print appropriate messages for stack overflow, stack underflow
2	**1**	WAP to convert a given valid parenthesized infix arithmetic expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide)
3	**2**	WAP to simulate the working of a queue of integers using an array. Provide the following operations a) Insert b) Delete c) Display The program should print appropriate messages for queue empty and queue overflow conditions
4	**2**	WAP to simulate the working of a circular queue of integers using an array. Provide the following operations. a) Insert b) Delete c) Display The program should print appropriate messages for queue empty and queue overflow conditions
5	**3**	WAP to Implement Singly Linked List with following operations a) Create a linked list. b) Insertion of a node at first position, at any position and at end of list. c) Display the contents of the linked list.
6	**3**	WAP to Implement Singly Linked List with following operations a) Create a linked list. b) Deletion of first element, specified element and last element in the list. c) Display the contents of the linked list.
7	**3**	WAP Implement Single Link List with following operations a) Sort the linked list. b) Reverse the linked list. c) Concatenation of two linked lists
8	**3**	WAP to implement Stack & Queues using Linked Representation
9	**4**	WAP Implement doubly link list with primitive operations a) Create a doubly linked list. b) Insert a new node to the left of the node. c) Delete the node based on a specific value. c) Display the contents of the list
10	**5**	Write a program a) To construct a binary Search tree. b) To traverse the tree using all the methods i.e., in-order, preorder and post order c) To display the elements in the tree.

G **Proposed Alternate Assessment Tool Plan** *(if applicable)*

H **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Internal Choice	Two Question to be asked for 20 Marks each
Unit-5	Mandatory	One Questions to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	**35%**
Apply / Analyze	**40%**
Create / Evaluate	**25%**

Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Sem	3rd		
Course Title:	Object Oriented Java Programming		
Course Code:	19CS3PCOOJ		
L-T-P:	3-0-1	**Total Credits:**	4

A Syllabus

Unit No.	Topics	Hrs	Text book No.	Chapters
1	**The History and Evolution of Java:** Java's Lineage, Java's Magic: The Byte code, The Java Buzzwords. **An overview of Java:** Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements. **Data Types, Variables, and Arrays:** Java Is a Strongly Typed Language, Integers, Floating-Point Types, Characters, The Primitive Types, Booleans, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays.	7	1	1, 2, 3.
2	**Introducing Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, A Stack Class. **A Closer Look at Methods and Classes:** Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Introducing Access Control, Understanding static, Introducing final, Using Command-Line Arguments.	8	1	6, 7
3	**Inheritance:** Inheritance Basics, Member Access and Inheritance, A More Practical Example, A Superclass Variable Can Reference a Subclass Object, Using super, Using super to Call Superclass Constructors, A Second Use for super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Why Overridden Methods?, Applying Method Overriding, Using Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding, Using final to Prevent Inheritance, Local Variable Type Inference and Inheritance, The Object Class.	8	1	8
4	**Packages and Interfaces:** **Packages:** Defining a package, Finding packages and class path, Example, Access protection, importing packages. **Interfaces:** Defining Interface, Implementing Interface, Nested Interfaces, Applying interfaces, Variables in interface, Interfaces can be extended. **Generics:** Introduction to Generics, A Simple Generics Example. **Exception handling:** Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions, Creating your own exception subclasses.	8	1	9, 10, 14
5	**Multithreaded Programming:** The Java thread model, The Main thread, Creating a thread, creating multiple threads, Using isalive() and Join( ), thread priorities, Synchronization, Interthread communication. **Event Handling:** Two Event Handling Mechanisms, The Delegation Event Model, Events- Event Sources, Event Listeners, Event Classes- The MouseEvent Class, Event Listener Interfaces-The MouseListener Interface, the MouseMotionListener Interface, Using the Delegation Event Model – Handling Mouse Events. **Introduction the AWT: Working with Windows, Graphics and Text** AWT Classes, Window Fundamentals, Working with Frame Windows, Introducing Graphics, Working with Color.	8	1	11, 24, 25

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Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Java the Complete Reference	Herbert Schildt	11th Edition	Tata McGraw-hill Edition	2019

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to JAVA Programming	Y. Daniel Liang	9th edition	Pearson education	2012
2.	Programming in JAVA 5.0	James P Cohoon, Jack W Davidson	1st Edition	TATA McGraw hill	2006
3.	Core Java2	Cay S Horstmann, Gary Cornell	11th Edition	Prentice Hall.	2018
4.	Programming with Java A Primer	E.BalaGuruSwamy	5th Edition	McGraw Hill Education	2014

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1	Java, Java, Java Object-Oriented Problem Solving	R. Morelli and R. Walde	Third edition	Pearson Education, Inc	2012	https://ia800303.us.archive.org/26/items/JavaJavaJavaObject-orientedProblemSolving/jjj-os.pdf
2	The Art and Science of Java	Eric S. Roberts		Greg Tobin	2007	http://people.reed.edu/~jerry/121/materials/artsciencejava.pdf
3	Java Programming	Wikibooks Contributors	Seventh Edition	wikibooks.org	2016	https://upload.wikimedia.org/wikipedia/commons/e/e7/Java_Programming.pdf
4	Think Java How to Think Like a Computer Scientist	Allen B. Downey and Chris Mayfield	6.1.3	Green Tea Press Needham, Massachusetts	2016	https://www.pdfdrive.com/think-java-how-to-think-like-a-computer-scientist-e17327018.html
5	Introduction to Programming Using Java	David J. Eck	Eight Edition	CreateSpace	2014	http://math.hws.edu/javanotes/index.html

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1	Object Oriented Programming in Java	Courseera	2019	https://www.classcentral.com/course/coursera-object-oriented-programming-in-java-4212
2	Java Tutorial for Complete Beginners	Udemy	2020	https://www.udemy.com/course/java-tutorial/
3	Programming in Java	NPTEL	September 2020 - December 2020	https://swayam.gov.in/nd1_noc20_cs58/preview

B Course Outcomes

At the end of the course the student will be able to

CO1	Apply knowledge of Java constructs for developing programs/applications.
CO2	Analyse the given Java program to identify bugs and to write correct code.
CO3	Design Java programs/ applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of Java using eclipse.

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3													1	
CO2		3												2	
CO3			3											3	2
CO4					3									3	

D Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**2 Internals**	**20**
QUIZ	**1**	**5**
Lab Component	**2 Lab Tests**	**25**
Alternate Assessment Tool	**NA**	**--**
Total		**50**

E Tutorial Plan *(if applicable)*

F Laboratory Plan *(if applicable)*

Lab Program	Unit #	Program Details
1	**I**	Develop a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solutions.
2	**II**	Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.
3	**II**	Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.
4	**III**	Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

5	III	Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance.
6	IV	Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.
7	IV	Write a program to demonstrate generics with multiple object parameters.
8	IV	Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception Wrong Age( ) when the input age<0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >=father's age.
9	V	Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds.
10	V	Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

G Alternate Assessment Tool Plan *(if applicable)*

H SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	50%
Create / Evaluate	25%

Sem	3rd		
Course Title:	Computer Organization and Architecture		
Course Code:	19CS3PCCOA		
L-T-P:	3-0-0	**Total Credits:**	**3**

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
Unit-1	**Basic Structure of Computers and Instruction Set Architecture:** Functional Units, Basic Operational Concepts, Number Representation and Arithmetic Operations , Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language,	8 Hrs	Text Book 1: Chapter 1: 1.2, 1.3, 1.4, Chapter 2: 2.1, 2.2, 2.3, 2.4, 2.5
Unit-2	Stacks, Subroutines, Additional Instructions, **Basic Input/Output:** Accessing I/O Devices, Interrupts, Bus Structure, Bus Operation, Arbitration	7 Hrs	Text Book 1: Chapter 2: 2.6, 2.7, 2.8, Chapter 3: 3.1, 3.2, Chapter 7: 7.1, 7.2, 7.3
Unit-3	**Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Memory Hierarchy, **Cache Memories:** Mapping Functions, Virtual Memory	8 Hrs	Text Book 1: Chapter 8: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6: 8.6.1, 8.8
Unit-4	**Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Unsigned Numbers, Multiplication of Signed Numbers, **Fast Multiplication:** Bit-Pair Recoding of Multipliers, Integer Division, **Floating-Point Numbers and Operations:** Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation , Implementing Floating-Point Operations	8 Hrs	Text Book 1: Chapter 9: 9.1, 9.2, 9.3, 9.4, 9.5.1, 9.5.2, 9.5.3, 9.6, **9.7:** 9.7.1, 9.7.2, 9.7.3
Unit-5	**Basic Processing Unit:** Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control **Parallel Computer Architecture:** Processor Architecture and Technology Trends, Flynn's Taxonomy of Parallel Architectures, **Memory Organization of Parallel Computers**: Computers with Distributed Memory Organization, Computers with Shared Memory Organization, **Thread-Level Parallelism:** Simultaneous Multithreading, Multicore Processors	8 Hrs	Text Book 1: Chapter 5: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Text Book 2: Chapter 2: 2.1, 2.2, **2.3:** 2.3.1, 2.3.2, **2.4:** 2.4.1, 2.4.2

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Computer Organization And Embedded Systems	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian	6th Edition	McGraw-Hil	2012
2.	Parallel Programming for Multicore and Cluster Systems	Thomas Rauber, Gudula Runger	2nd Edition	Springer	2013

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Computer Organization and Design - The Hardware/Software Interface	David A. Patterson, John L. Hennessy	4th Edition	Elsevier	2008
2.	Computer Organization & Architecture	William Stallings	7th Edition	PHI	2010

E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	Computer Organization and Architecture	William Stallings	9th Edition	Pearson	2013	http://www.allitebooks.in/computer-organization-and-architecture-9th-edition/

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Computer Organization and Architecture A Pedagogical Aspect	NPTEL	2019	https://onlinecourses.nptel.ac.in/noc19_cs04/preview
2.	Computation Structures 3: Computer Organization	Edx	2019	https://www.edx.org/course/computation-structures-3-computer-mitx-6-004-3x-0

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** the concepts of basic functional units to demonstrate the working of computational system
CO2	Ability to **analyse** the design issues in the development of processor and other components to articulate improvement in computer design
CO3	Ability to **design** memory modules and Arithmetic Logic unit by analysing performance issues

C   CO-PO-PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2														
CO2		3												1	
CO3			3											2	

D   Assessment Plan (for 50 marks of CIE)

Tool	**Remarks**	**Marks**
Internals	---	40
QUIZ/AAT	---	10
Lab Component	---	--
Total		50

E   Tutorial Plan *(if applicable)*

Not Applicable

F   Laboratory Plan *(if applicable)*

Not Applicable

G   Alternate Assessment ToolPlan *(if applicable)*

Not Applicable

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Sem	3rd		
Course Title:	Logic Design		
Course Code:	19CS3PCLOD		
L-T-P:	2-1-0	**Total Credits:**	3

A **Syllabus**

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**The Basic Gates**: Review of Basic Logic gates, Positive and Negative Logic, Introductionto HDL. **Combinational Logic Circuits:** Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions,Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McClusky Method, Hazards and Hazard covers, HDL Implementation Models.	5	Chapter 2-2.1, 2.2, 2.3, 2.4, 2.5 Chapter 3-3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11
2	**Data-Processing Circuits:** Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD to Decimal Decoders, Seven Segment Decoders, Encoders, Exclusive-OR Gates, Parity Generators and Checkers, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays, HDL Implementation of Data Processing Circuits.	5	Chapter 4-4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11, 4.12, 4.14
3	**Flip- Flops:** RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS FLIP-FLOP, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIPFLOPs. **Flip- Flops:** FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, Switch Contact Bounce Circuits, Various Representation of FLIP-FLOPs, HDL Implementation of FLIP-FLOP. **Registers:** Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In -Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers, Register implementation in HDL.	6	Chapter 8-8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.13 Chapter 9 –9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8
4	**Counters:** Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus. **Counters:** Decade Counters, Presettable Counters, Counter Design as a Synthesis problem, A Digital Clock, Counter Design using HDL.	5	Chapter 10-10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9
5	**Design of Sequential Circuit:** Model Selection, State Transition Diagram, State Synthesis Table, Design Equations and Circuit Diagram, Implementation using Read Only Memory, Algorithmic State Machine, State Reduction Technique, Analysis of Asynchronous Sequential Circuit, Problems with Asynchronous Sequential Circuits, Design of Asynchronous Sequential Circuit	5	Chapter 11-11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10

Prescribed Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Digital Principles and Applications,	Donald P Leach, Albert Paul Malvino & Goutam Saha	7th Edition	Tata McGraw Hill	2011

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Illustrative Approach to Logic Design,	R D Sudhaker Samuel	---	Sanguine-Pearson,	2010
2.	Digital Logic and Computer Design,	M Morris Mano	10th Edition,	Pearson	2008
3.	Digital Principles & Design	Donald D Givone	1st edition	Tata McGraw Hill	2009

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Introduction to Logic Design	Alan B. Marcovitz	Third Edition	McGraw-Hill	2010	https://zodml.org/sites/default/files/Introduction_to_Logic_Designs_%28Third_Edition%29.pdf
2.	Foundation of Digital Electronics and Logic Design	Subir Kumar Sarkar | Asish Kumar De | Souvik Sarkar	-	Panstan ford Publishing	2015	http://www.panstanford.com/pdf/9789814364591fm.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Digital Circuits and systems	NPTEL	2019	https://onlinecourses.nptel.ac.in/noc19_cs72
2.	Digital Circuits and Systems	SWAYAM IIT-Madras	2019	https://swayam.gov.in/ndl_noc19_ee51

B   **Course Outcomes**
At the end of the course the student will be able to

CO1	Ability to apply the minimization techniques to digital circuits.
CO2	Ability to analyse functionality of the digital circuits.
CO3	Ability to design efficient combinational and sequential logic circuit implementations from functional description of digital systems.
CO4	Ability to use CAD tools to simulate and verify logic circuits.

C   **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														3
CO2		2													3
CO3			3												3
CO4					3										3

D   **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internals	---	**40**
QUIZ/AAT	---	**-**
Lab Component	---	**-**
Alternate Assessment Tool		**10**
Total		**50**

E   Tutorial Plan *(if applicable)*

Tutorial #	Unit #	Topic
1	1	Introduction to HDL,HDL Implementation Models
2	1	Numericals on Simplification by K maps
3	1	Simplification by Quine-McClusky Method
4	2	Data processing circuits
5	2	HDL implementation of Data processing circuits
6	3	Registers
7	3	HDL Implementation of FLIP-FLOP.
8	3	HDL Implementation of Registers.
9	4	Counters
10	4	Counter Design using HDL

Tutorial Evaluation Rubrics: 10 Marks

Sl. No	Criteria	Excellent	Good	Average	Max Score
Data sheet					
A	Problem statement	9-10	6-8	1-5	10
B	Design & specifications	9-10	6-8	1-5	10
C	Expected output	9-10	6-8	1-5	10
Record					
D	Simulation/ Conduction of the experiment	14-15	11-13	1-10	15
E	Analysis of the result.	14-15	11-13	1-10	15
Viva					40
Total					100
Scale down to 10 marks					

F   Laboratory Plan : ----

G   Alternate Assessment Tool Plan

The students will be asked to design and simulate digital circuit using HDL.

H   SEE Exam Question paper format

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	50%
Create / Evaluate	25%

Course	Environmental studies	Course Code	19HS3PCEVS / 19HS4PCEVS	SEE Duration	3 hours
Credits	02	L:T:P	2: 0 : 0	SEE+ CIE marks	50+50

COURSE OBJECTIVE:
1. To acquire the knowledge of environmental studies, it's need & importance
2. To understand the concept, structure and function of different ecosystems
3. To know about pollution problems and green technology
4. To develop a sense of responsibility about the role of students in fostering the idea of learning to live in harmony with nature.
5. To aware the studies about current conditions of environment
6. To give an opportunity to the student to experience the interdisciplinary nature of the environmental studies
7. To create interest in students about the environment through a project work
8. To encourage student to prevent the environmental degradation

COURSE OUTCOME:	
CO1:	Understand the components and impacts of human activities on environment.
CO2:	Apply the environmental concepts for conservation and protection of natural resources.
CO3:	Identify and establish relationship between social, economical and ethical values from environmental perspectives.

Unit – I: Introduction to Environment:

Definition about Earth, atmosphere, hydrosphere, lithosphere and biosphere.
Structure of Atmosphere: Troposphere, Stratosphere, Mesosphere, Ionosphere, Exosphere.
Internal structure of the Earth: Crust, Mantle, Core.
Ecosystem, types of Ecosystem: Land, Forest, Water, Desert, Marine.
Effects of Human activities on Environment: Agriculture, Housing, Industries, Mining and
Transportation. 06 Hrs

Unit-II: Natural Resources:
Water resources: availability, use and consequences of over utilisation, water conflicts.
Case studies
Mineral resources: Definition, types, environmental impact of mining
Forest resources: Uses, effects of deforestation, remedial measures
Energy resources: renewable and non-renewable, growing needs, types of energy resources: hydroelectric, wind power, fossil, solar, nuclear and bio gas.
Hydrogen as an alternate future source of energy 06 Hrs

Unit-III: Environmental pollution
Introduction, causes, effects and control measures.
Water pollution, land pollution, noise pollution, air pollution and marine pollution-case studies.
Environmental management: Solid waste, hazardous waste, e-waste, bio medical waste 06 Hrs

Unit-IV: Social issues and Environment
Population growth.
Climatic changes: Global warming, acid rain, ozone layer depletion.
Water conversation: rain water harvesting and ground water recharging.
Disaster management: floods, earthquakes, landslides-case studies
Environmental Protection Acts: Air, Water, land and Noise (Prevention and Control of pollution), Forest conservation, Wildlife protection. 04 Hrs

TEXT BOOKS:

1. Environmental studies by - Dr. Geetha Balakrishnan (Revised Edition)
2. Ecology by - Subramanyam (Tata McGraw Hill Publication)
3. Environmental studies by - Dr. J. P. Sharma (Third edition)
4. Environmental studies by - Smriti Srivastav

REFERENCES:

1. Environmental studies by – Benny Joseph
2. Environmental studies by – Dr. D.L.Manjunath

LEARNING RESOURCES:

1. NPTEL (Open Sources / power point and visuals)
2. Ecological studies / IITR / Open Sources
3. Ministry of Environment and forest & wildlife.

MOOC's: MOOCS – https://www.coursera.org / course / sustain
SEE PAPER PATTERN:
Sub: Environmental Studies (19HS4PCEVS)

SEE Question paper consist of two parts, Part –A consists of 40 MCQ'S, one mark each. Whereas Part –B consist of 5 main questions of 20 marks each.

Student should answer Part – A compulsory and any three full questions from Part-B, covering all units.

MAPPING SCALE   1 TO 3

COURSE : EVSCODE: 19 HS4PCEVS														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1			-											
CO2				-	1										-
CO3		1	-		-	-	-	-			-				

	COURSE : EVS CODE : **19 HS4ICEVS**				
Taxonomy Levels and COs	Remember/ understand	Apply	Analyze	Design	Create or any other
CO1	✓	-	-		
CO2		✓			
CO3		✓			

Sem.	3rd		
Course Title:	**Project Work-1**		
Course Code:	**19CS3PWPW1**		
L-T-P:	**0-0-2**	**Total Credits:**	**2**

A **Introduction:**

1. Website based Application Development - Only Front End: Under this project work, student should develop front end for the websites of any chosen topic. Students can form a group with minimum of two and maximum of four.

2. Teacher allotted for project work to students should teach students front end web technologies such as HTML, CSS, Java Script and basics of PHP (Sessions/Cookies Management) during Class/Lab hours as per the allotment.

3. Teacher allotted for project work should guide the students in choosing the topic and towards carrying out project work and complete the evaluation of assigned students.

4. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

B **Course Outcomes**
At the end of the course the student will be able to

CO1	Ability to apply practical knowledge and latest tools usage along with project development.
CO2	Ability to design and develop a project using web technologies to solve societal problems.
CO3	Ability to report and present the implemented solutions in a team

C **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3				3										
CO2	3	3	3	2	3	2	2	2				1	1	3	2
CO3								2	3	3					

D **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internals	---	---
QUIZ	---	---
Lab Component	---	50
Alternate Assessment Tool	----	--
Total		**50**

Rubrics for Project Evaluation:

Criteria	Exemplary	Proficient	Partially Proficient	Points
Layout	(10) The Web site has an exceptional design, attractive and usable layout. It is easy to locate all important elements.	(6) The Web pages have an attractive design and usable layout. It is easy to locate all important elements.	(4) The Web pages have a usable design layout, but may appear busy or boring. It is easy to locate most of the important elements.	__ / 10

Criteria	Exemplary	Proficient	Partially Proficient	Points
Navigation	(5) Links for navigation are clearly labeled, consistently placed, allow the reader to easily move from a page to related pages (forward and back), and take the reader where s/he expects to go. A user does not become lost.	(3) Links for navigation are clearly labeled, allow the reader to easily move from a page to related pages (forward and back), and internal links take the reader where s/he expects to go. A user rarely becomes lost.	(2) Links for navigation take the reader where s/he expects to go, but some needed links seem to be missing. A user sometimes gets lost.	___ / 5
Validation of Form fields	(10) Validations have been carried out for all form fields completely in all the webpages.	(6) Most of the validations have been carried out for all form fields completely in all the webpages.	(4) Few of the validations has been carried out for the form fields in the webpages.	___ /10
Background	(5) Background is exceptionally attractive, consistent across pages, adds to the theme or purpose of the site, and does not detract from readability.	(3) Background is attractive, consistent across pages, adds to the theme or purpose of the site, and does not detract from readability.	(2) Background is consistent across pages and does not detract from readability.	___ /5
Content Accuracy	(5) All information provided by the student on the Web site is accurate, Legal and all the requirements of the assignment have been met.	(3) Almost all the information provided by the student on the Web site is accurate, legal and most of the requirements of the assignment have been met.	(2) Almost all of the information provided by the student on the Web site is accurate, legal and few of the requirements of the assignment have been met.	___ / 5
Report	(5) Clear and Effective writing and adherence to appropriate style guidelines	(3) Writing that is clear and effective for the most part and minor errors in adherence to appropriate style guidelines	(2) Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines	___ /5
Oral communication / Presentation	(5) Clear and effective communication	(3) Communication is clear	(2) Unclear communication	___ /5
Participation in Discussions	(5) Provided many good ideas; inspired others; clearly communicated ideas, needs, and feelings.	(3) Participated in discussions; on some occasions, made suggestions.	(2) Listened mainly; Rarely spoke up, and ideas were off the mark.	___ /5
Total				___ / 50

E   **Tutorial Plan** *(if applicable)*

F   **Laboratory Plan** *(if applicable)*
Project Topics for Website Development:

Department Lab Stock Book Maintenance System; Department Faculty Weekly Report Submission System; Department Faculty Self-Assessment Report Submission System; Department Faculty Self –Appraisal form Submission System; Department Student Project Submission System; Department Conference Paper Submission System; College TEQIP student project proposal submission system; College TEQIP Faculty Workshop/Conference/Seminar Application Submission System; College Exam Application Form Submission System

Note: Apart from the above mentioned project topics if student groups come up with any innovative project ideas which are useful for the Department / College academic purpose will be considered based on the approval and acceptance from class teacher.

Sl. No	Week	Activity	Content deliverables by the assigned teacher
1	1st	Formation of groups. Note: Student groups of size 2 or 3 or 4	Deploying source code in the web server (XAAMP) and server setup.
2	2nd	Project topic selection by each group	Program to demonstrate HTML document creation: • To display static content(s) • To handle form(s) elements such as Text Boxes, Check Boxes, Radio buttons etc.,
3	3rd	Presentation: Student and Project topic introduction by each group	Program to demonstrate basics of CSS concepts. -Levels of Style sheets -Selector forms -Box Model
4	4th 5th and 6th	Design Layout of the Web Pages	Program to demonstrate basics of Java Script concepts. • A table of the numbers from 5 to 15 and their squares and cubes. • The first 20 Fibonacci numbers. • The words of the input text, in alphabetical order. • The number of names in the given array that end in either "A" or "Y" • The position in the String of the leftmost vowel. • The numbers of negative elements, zeros, and values greater than Zeros in the given array.
5	7th	Presentation on Front-end Design by each group	Program to demonstrate basics of PHP concepts.
6	8th and 9th	Design and Development of connecting among different web pages	Program to demonstrate basics of PHP concepts.
7	10th	Presentation by each group	
8	11th	Complete Project Work Demonstration by each group	
9	12th	Project Report Preparation	

G   **SEE Exam (50 Marks)**
Evaluation of Projects carried out by students from External examiner along with internal faculty.

Sem.	3rd		
Course Title:	Physical Activity (Sports/ Yoga Etc.)		
Course Code:	19CS3NCNC3		
L-T-P:	0-0-0	Total Credits:	ZERO PASS / FAIL

A   Introduction

1. Student can participate in any of the physical activities such as Sports, Marathon, Yoga conducted by college or any organization.

2. Student should produce participation certificate for clearing this mandatory course.

3. Note: If student is unable to participate in outside physical activities then department Head should take care of conducting Yoga and Meditation of one or two day event in the college.

4. Physically challenged students can produce participation certificate of any technical/cultural events conducted by college/department clubs.

B   Course Outcomes

CO1	Promoting comprehensive health, safety, and physical fitness by engaging in competitive activities
CO2	Demonstrates personalities of virtuous sportsmanship and teamwork in both competition and practice.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1						3									
CO2									3						

D   Assessment Plan

CATEGORY	MARKS (RANGE)	SPORTS & GAMES
L1	90 (90-100)	• Winning Certificates/ at International/National / Zonal Level Competitions. • Representing State & Zonal level teams
L2	80 (80-89)	Winning Certificates/ at State University Level Competitions. Representing VTU team.
L3	70 (70-79)	Winning Certificates Inter-Collegiate competitions. Representing college team.
L4	60 (60-69)	Winning Certificates at college level events.
L5	50 (50-59)	• Winning Certificates at Departmental events. • Coordinators- Blood donations (Volunteers)
L6	40 (40-49)	Participation in Inter-Collegiate /College level events/ Blood donation /NGO/ Personality development Programs

E   SEE Exam Question paper

Student should produce participation certificate for clearing this mandatory course.

Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

THIRD SEMESTER B.E COURSE
(Common to All Branches)

Course Title	Additional Mathematics-I	Course Code	19MA3IMMAT
Credits	00	L – T – P	3 – 1 – 0
Contact hours	48 hours (36L+12T)	III semester Lateral Entry students	

Prerequisites: Basic concepts of Trigonometry, Trigonometric formulas, concept of differentiation, concept of integration.

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as differentiation, differential equations, vectors and orthogonal curvilinear coordinates for different branches of engineering.

UNIT-1
DIFFERENTIAL AND INTEGRAL CALCULUS   **[9 Hours]**

List of standard derivatives including hyperbolic functions, rules of differentiation. Taylor's and Maclaurin's series expansion for functions of single variable. List of standard integrals, integration by parts. Definite integrals – problems.

(7L+2T)

UNIT-2
POLAR COORDINATES AND PARTIAL DERIVATIVES   **[10 Hours]**

Polar curves: Polar coordinates, angle between radius vector and tangent, angle between two polar curves. Partial differentiation. Total differentiation-Composite and Implicit functions. Jacobians and their properties (without proof) – Problems.

(7L+3T)

UNIT-3
VECTOR CALCULUS AND ORTHOGONAL CURVILINEAR COORDINATES   **[10 Hours]**

Recapitulation of scalars, vectors and operation on scalars and vectors. Scalar and vector point functions. Del operator, gradient-directional derivative, divergence, curl and Laplacian operator.
Vector identities (without proof). Cylindrical and Spherical polar coordinate systems. Expressing a vector point function in cylindrical and spherical systems. Expressions for gradient, divergence, curl and Laplacian in orthogonal curvilinear coordinates.

(7L+3T)

UNIT-4
FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS   **[9 Hours]**

Introduction to first order differential equations. Linear equation and its solution. Bernoulli's equation and its solution. Exact differential equation and its solution. Orthogonal Trajectories.

(7L+2T)

UNIT-5
SECOND AND HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS   **[10 Hours]**

Ordinary differential equations with constant coefficients: Homogeneous differential equations, non-homogeneous differential equations – Particular integral for functions of the type $f(x) = e^{ax}$, $\sin(ax)$, $\cos(ax)$, x^n, method of variation of parameters, Cauchy's and Legendre linear differential equations

(8L+2T)

On completion of the course, students will have the ability to:

Course Code	CO #	COURSE OUTCOME (CO)	PO
19MA3IMMAT	**CO 1**	Understand the basic concepts of differentiation and integration.	**1**
	CO 2	Apply the concepts of polar curves and multivariate calculus.	
	CO 3	Apply analytical techniques to compute solutions of first and higher order ordinary differential equations.	
	CO 4	Apply techniques of vector calculus to engineering problems.	
	CO 5	Comprehend the generalization of vector calculus in curvilinear coordinate system.	

Text Book:
1. Higher Engineering Mathematics, B. S. Grewal, 43rd edition, 2014, Khanna Publishers
2. Advanced Engineering Mathematics, 4th edition, 2011, by Dennis G. Zill and Cullen, Jones and Bartlett India Pvt. Ltd.

Reference Book:
1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Precise Textbook series, Vol. 1 and Vol. 2, 10th edition, 2014, Wiley- India.
2. Higher Engineering Mathematics, B. V. Ramana, 2007, Tata McGraw Hill.

E books and online course materials:
1. Engineering Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001
2. http://books.google.co.in/books/about/Engineering_Mathematics.html?id=FZncL- xB8dEC&redir_esc=y.
3. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
4. http://ocw.mit.edu/courses/mathematics/ (online course material)

Online Courses:
1. https:// www.khanacademy.org/Math
2. https:// www.class-central.com/subject/math (MOOCS)

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B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

FOURTH SEMESTER B.E COURSE - (CSE/ISE)

Course Title	Linear Algebra	Course Code	19MA4BSLIA
Credits	04	L – T – P	3 – 1 – 0
Contact hours	48 hours (36L+12T)	CS/IS Cluster	

Prerequisites: Vector Algebra, Matrix computations, Calculus, Geometry, Group Theory.

Course Objectives: To provide the students with a foundation of concepts in linear algebra that is essential to engineers of computer and information science.

UNIT-1

SYSTEM OF LINEAR EQUATIONS AND VECTOR SPACES [11 hours]

Elementary row operations, echelon forms, rank of matrix.
System of Linear Equations: solution of homogeneous equations, consistency of non-homogeneous system of linear equations. Gauss elimination method, LU decomposition method.
Vector spaces: Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence, Basis and Dimension, Coordinates.

(9L+2T)

UNIT-2

LINEAR TRANSFORMATIONS [9 hours]

Introduction, Linear Mappings, Geometric linear transformation of $\square^2$, Kernel and Image of a linear transformations, Matrix representation of linear transformations, Rank-Nullity Theorem(No proof), Singular and Nonsingular linear transformations, Invertible linear transformations.

(7L+2T)

UNIT-3

EIGENVALUES AND EIGENVECTORS [10 Hours]

Introduction, Polynomials of Matrices, Characteristic polynomial, Cayley-Hamilton Theorem, eigenvalues and eigenvectors, eigen spaces of a linear transformation, Diagonalization, Minimal Polynomial, Characteristic and Minimal Polynomials of Block Matrices, Jordan Canonical form, Solving differential equations in Fundamental form.

(7L+3T)

UNIT-4

INNER PRODUCT SPACES [10 hours]

Inner product, inner product spaces, length and orthogonality, orthogonal sets and Bases, projections, Gram-Schmidt process, QR-factorization, least squares problem and least square error.

(7L+3T)

SYMMETRIC MATRICES AND QUADRATIC FORMS [8 hours]

Diagonalization of real symmetric matrices, Orthogonal diagonalization of real symmetric matrices, quadratic forms and its classifications, Singular value decomposition

(8L+2T)

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On completion of the course, student will have the ability to:

Course Code	CO #	Course Outcome (CO)	PO
19MA4BSLIA	**CO 1**	Apply the concepts of Matrices to linear systems and Vectors spaces.	1
	CO 2	Relate the concepts of Eigen values, Eigen vectors & functions to linear algebra.	
	CO 3	Apply the concepts of inner products to matrix decomposition.	

Text Books:

1. Linear Algebra and its applications, David C. lay, Steven R. lay, Judi J Mc. Donald, 5th Edition, 2015, Pearson Education.
2. Linear Algebra and its applications, Gilbert Strang, 4th edition, 2005, Brooks Cole.

Reference Books:

1. Schaum's outline series-Theory and problems of linear algebra, Seymour Lipschutz, 5th edition, 2012, McGraw-Hill Education.
2. Linear Algebra an Introduction, Richard Bronson & Gabriel B. Costa, 2nd edition.

E books and online course materials:

1. https://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/index.htm
2. https://www.math.ucdavis.edu/~linear/linear.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/linear-algebra-machine-learning
2. https://nptel.ac.in/syllabus/111106051/

Question Paper Pattern:

1. Five full questions to be answered.
2. To set one question each in Units 2, 4, 5 and two questions each in Unit 1 and Unit 3.

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B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Sem	4th			
Course Title:	**Theoretical Foundations of Computations**			
Course Code:	**19CS4PCTFC**			
L-T-P:	**3-1-0**	**Total Credits:**		**4**

A **Syllabus**

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction to Finite Automata** Introduction to Finite Automata, Central Concepts of Automata Theory, Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Finite Automata with Epsilon Transition, An Application Text Search.	8	Textbook 1 Chapter 1-1.1.1, 1.5 Chapter 2- 2.2, 2.3, 2.4, 2.5
2	**Regular Expressions and Languages** Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Proving Languages Not to Be Regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata	8	Textbook 1 Chapter 3-3.1, 3.2, 3.3 Chapter 4- 4.1, 4.2, 4.4
3	**Context Free Grammars and Languages Parse Trees** Applications of Context Free Grammars, Applications of Context Free Grammars, Ambiguity in Grammars and Languages, Eliminating Useless Symbols, Computing the Generating and Reachable Symbols, Eliminating Epsilon Productions, Eliminating Unit Productions, Chomsky Normal Form	8	Textbook 1 Chapter 5-5.1,5.2,5.3, 5.4 Chapter 7-7.1.1 - 7.1.5
4	**Pushdown Automata** Definition of the Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's , Deterministic Pushdown Automata, The Pumping Lemma for Context Free Languages, Closure Properties of Context Free Languages	8	Textbook 1 Chapter 6 - 6.1,6.2,6.3, 6.4 Chapter 7-7.2, 7.3
5	**Problems That Computers Cannot Solve** The Turing Machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Restricted Turing Machines, Turing Machines and Computers, Definition of Post's Correspondence Problem, A Language That Is Not Recursively Enumerable, An Undecidable Problem That is RE Other Undecidable Problems	7	Textbook 1 Chapter 8 – 8.1, 8.2, 8.3, 8.4, 8.5, 8.6 Chapter 9- 9.1, 9.2, 9.4.1, 9.5

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Automata Theory, Languages and Computation	John E. Hop croft, Rajeev Motwani, Jeffrey D.Ullman: education	3rd Edition	Pearson	2007

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Languages and Automata Theory	John C Martin	3rd Edition	Tata McGraw-Hill	2007
2.	An Introduction to formal Languages and Automata	Peter Linz	II edition	Narosa publishing house	1997
3.	Introduction to Computer Theory	Daniel I.A. Cohen	2nd Edition	John Willy & Sons Inc.,	2000

E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	Introduction to Theory of Computation	Anil Maheshwari, Michiel smid	---	Carleton University	2019	https://cglab.ca/~michiel/TheoryOfComputation/TheoryOfComputation.pdf

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Automata Theory	edx	2020	https://www.edx.org/course/automata-theory
2.	www.nptel.ac.in	IIT B	2019	nptel.ac.in/courses/106104028/theory of computation.
3.	https://lagunita.stanford.edu /courses	Stanford University	Self –paced 2019	https://lagunita.stanford.edu/courses/course-v1:ComputerScience+Automata+SelfPaced/about

B   Course Outcomes
At the end of the course the student will be able to

CO1	Able to Apply the knowledge of Automata Theory, Grammars & Regular Expressions for solving the Problem.
CO2	Ability to analyse the given Automata, Regular Expression & Grammar to know the Language it represents.
CO3	Design Automata & Grammar for pattern recognition and syntax checking.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3													2	
CO2		2												2	
CO3			2											2	

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**Two**	40
QUIZ/AAT	**Two**	10
Lab Component	---	---
Total		**50**

E   Tutorial Plan *(if applicable)*

Tutorial #	Unit #	Topic
1	I	Problems on DFA Book 1, Chapter 2. Exercise 2.2.1, 2.2.6, 2.2.7,
2	I	Problems on NFA Book 1, Chapter 2. Exercise 2.3.1, 2.3.2, 2.3.3, 2.4.1
3	I	Problems on conversion of NFA to DFA Book 1, Chapter 2. Exercise 2.5.1, 2.5.2, 2.5.3
4	I	Real-life examples for DFA and NFA Book 1, Chapter 2. Exercise 2.2.10 Design a Vending Machines, Video Games, Traffic lights
5	II	Problems on regular expressions Book 1, Chapter 3. Exercise 3.1.1, 3.1.2, 3.1.3
6	II	Problems on regular expressions Book 1, Chapter 3. Exercise 3.1.4, 3.1.5, 3.1.3, 3.2.1, 3.2.3
7	III	Problems on Grammar and Minimization Book 1, Chapter 4. Exercise 4.2.1, 4.4.1, 4.4.2
8	III	Problems on CFG Book 1, Chapter 5. Exercise 5.1.1, 5.1.2, 5.4.5, 5.4.7
9	IV	Problems on PDA Book 1, Chapter 6. Exercise 6.2.1, 6.2.2, 6.2.3
10	IV	Problems on conversion of CGF to PDA and vice versa Book 1, Chapter 6. Exercise 6.3.1, 6.3.2, 6.3.3 Book 1, Chapter 7. Problem 7.4, 7.8
11	V	Problems on Turing machine Book 1, Chapter 8. Exercise 8.2.1, 8.2.2, 8.2.3
12	V	Book 1, Chapter 8. Exercise 8.4.9, 8.4.10

F   Laboratory Plan *(if applicable)*

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Sem	4th		
Course Title:	Database Management Systems		
Course Code:	19CS4PCDBM		
L-T-P:	3-0-1	**Total Credits:**	**4**

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction to Databases**: Introduction, An Example, Characteristics of Database approach, Advantages of using DBMS approach, When not to use a DBMS **Database System Concepts and Architecture:** Data models, Schemas and instances, Three schema architecture and data independence Database languages and interfaces, The database system environment, **SQL**: SQL Data Definition and Data Types specifying basic constraints in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL, Additional features of SQL ,More complex SQL Queries, Specifying Constraints as Assertions and Triggers, Views (Virtual Tables) in SQL,Schema Change Statement in SQL.	7	**Text book 1** Chapter 1: 1.1, 1.2, 1.3, 1.6, 1.8 Chapter 2: 2.1, 2.2, 2.3, 2.4 Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5 Chapter 5: 5.1, 5.2, 5.3, 5.4
2	**Data Modelling using the Entity-Relationship(ER) model**: Using High-Level conceptual Data Models for Database Design, A sample Database Application, Entity types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher than two, Relational Database Design using ER-to-Relational Mapping.	8	**Text book 1** Chapter 7: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.9 Chapter 9: 9.1
3	**Relational Data Model and Relational Database Constraints:** Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations. **Relational Algebra**: Unary Relational Operations, SELECT and PROJECT, Relational Algebra Operations from Set Theory Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.	8	**Text book 1** Chapter 3: 3.1, 3.2, 3.3 Chapter 6: 6.1, 6.2, 6.3, 6.4, 6.5
4	**Database Design Theory and Normalization:** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi-valued Dependencies and a Fourth Normal Form, Join Dependencies, Fifth Normal Form.	8	**Text book 1** Chapter 15: 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7
5	**Transaction Processing, Concurrency Control, and Recovery:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Two-Phase Locking Techniques for Concurrency Control, Recovery Concepts ,NO-UNDO/REDO Recovery Techniques based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, The ARIES Recovery Algorithm.	8	**Text book 1** Chapter 21: 21.1, 21.2, 21.3, 21.4, 21.5 Chapter 22: 22.1 Chapter 23: 23.1, 23.2, 23.3, 23.4, 23.5

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	**Fundamental of Database Systems**	Ramez Elmasri and Shamkant B Navathe	Sixth Edition	Pearson	2017
2.	**Database Management Systems**	Ramakrishnan and Gehrke	3rd Edition	McGraw Hill	2014

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	**An Introduction to Database Systems**	C.J.Date, A.Kannan, S.Swamynathan	8th Edition	Pearson Education	2006
2.	**Database Systems: The Complete Book**	Hector Garcia-Molina,Jeffrey D.Ullman, Jennifer Widom ,	Second Edition	Pearson Education	2001
3.	**Database System Concepts**	Abraham Silberschatz, HenryF. Korth, S. Sudarshan	Sixth Edition	Tata McGraw-Hill	2010

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	An Introduction to Relational Database Theory	Hugh Darwen	3rd Edition	Ventus Publishing ApS	2012	https://zodml.org/sites/default/files/An_Introduction_to_Relational_Database_Theory_0.pdf
2.	Database Systems: Design, Implementation, and Management, Eighth Edition	Peter Rob and Carlos Coronel	8th Edition		2009	http://m5zn.com/newuploads/2015/04/27/pdf/b38963a5c2824b9.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Data Base Management System	NPTEL	2019	https://onlinecourses.nptel.ac.in/noc19_cs12/preview
2.	Data Base Management System	SWAYAM	2017	https://swayam.gov.in/course/220-database-management-system
3.	SQL tutorial	W3 schools	--	www.w3schools.com/sql/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** the concepts of database management system for various applications.
CO2	Ability to **analyse** the given database concepts to its correctness.
CO3	Ability to **design and demonstrate** conceptual models, query and optimization.
CO4	Ability to **conduct** experiments to **demonstrate** the various SQL query processing.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3												1		
CO2		3												2	
CO3			3											3	
CO4			3		3									2	

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**Average of two**	**20**
QUIZ	**ONE**	**5**
Lab Component	Lab Test	**25**
Alternate Assessment Tool	**---**	
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Instructions to Students to be followed in each DBMS lab:

1. Each Student should write down the work carried out and the outputs in the observation book and get it evaluated by the respective lab faculty in-charge.

2. Each Student should bring the lab record with the programs and output written for the programs completed in their respective previous week and get it evaluated by the lab faculty in-charge.

Writing SQL Queries using Oracle for the following database systems:

Experiment #	Name of Experiment
1	Insurance Database
2	Banking Enterprise Database
3	Supplier Database
4	Student Faculty Database
5	Airline Flight Database
6	Order Processing Database
7	Book dealer Database
8	Student Enrolment Database
9	Movie Database
10	College Database

PROGRAM 1: INSURANCE DATABASE

Consider the Insurance database given below. The primary keys are underlined and the data types are specified.

PERSON (driver-id #: String, name: String, address: String)

CAR (Regno: String, model: String, year: int)

ACCIDENT (report-number: int, date: date, location: String)

OWNS (driver-id #: String, Regno: String)

PARTICIPATED (driver-id: String, Regno: String, report-number: int, damage-amount: int)

i. Create the above tables by properly specifying the primary keys and the foreign keys.

ii. Enter at least five tuples for each relation.

iii. Demonstrate how you

   a. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.

   b. Add a new accident to the database.

iv. Find the total number of people who owned cars that involved in accidents in 2008.

v. Find the number of accidents in which cars belonging to a specific model were involved.

PROGRAM 2. BANKING ENTERPRISE DATABASE

Consider the following database for a banking enterprise.

   BRANCH (branch-name: String, branch-city: String, assets: real)

   ACCOUNTS (accno: int, branch-name: String, balance: real)

   DEPOSITOR (customer-name: String, customer-street: String, customer-city: String)

   LOAN (loan-number: int, branch-name: String, amount: real)

   BORROWER (customer-name: String, loan-number: int)

i. Create the above tables by properly specifying the primary keys and the foreign keys.

ii. Enter at least five tuples for each relation.

iii. Find all the customers who have at least two accounts at the Main branch.

iv. Find all the customers who have an account at all the branches located in a specific city.

v. Demonstrate how you delete all account tuples at every branch located in a specific city.

PROGRAM 3. SUPPLIER DATABASE

Consider the following schema:

   SUPPLIERS (sid: integer, sname: string, address: string)

   PARTS (pid: integer, pname: string, color: string)

   CATALOG (sid: integer, pid: integer, cost: real)

The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in SQL:

i. Find the pnames of parts for which there is some supplier.

ii. Find the snames of suppliers who supply every part.

iii. Find the snames of suppliers who supply every red part.

iv. Find the pnames of parts supplied by Acme Widget Suppliers and by no one else.

v. Find the sids of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).

vi. For each part, find the sname of the supplier who charges the most for that part.

vii. Find the sids of suppliers who supply only red parts.

PROGRAM 4. STUDENT FACULTY DATABASE

Consider the following database for student enrolment for course:

   STUDENT (snum: integer, sname: string, major: string, level: string, age: integer)

   CLASS (name: string, meets at: time, room: string, fid: integer)

   ENROLLED (snum: integer, cname: string)

   FACULTY (fid: integer, fname: string, deptid: integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair

such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc)

Write the following queries in SQL. No duplicates should be printed in any of the answers.

i.   Find the names of all Juniors (level = JR) who are enrolled in a class taught by

ii. Find the names of all classes that either meet in room R128 or have five or more Students enrolled.

iii. Find the names of all students who are enrolled in two classes that meet at the same time.

iv. Find the names of faculty members who teach in every room in which some class is taught.

v.   Find the names of faculty members for whom the combined enrolment of the courses that they teach is less than five.

vi. Find the names of students who are not enrolled in any class.

vii. For each age value that appears in Students, find the level value that appears most often. For example, if there are more FR level students aged 18 than SR, JR, or SO students aged 18, you should print the pair (18, FR).

PROGRAM 5. AIRLINE FLIGHT DATABASE

Consider the following database that keeps track of airline flight information:

FLIGHTS (flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time, price: integer)

AIRCRAFT (aid: integer, aname: string, cruisingrange: integer)

CERTIFIED (eid: integer, aid: integer)

EMPLOYEE (eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as well; Every pilot is certified for some aircraft, and only pilots are certified to fly.

Write each of the following queries in SQL.

i.   Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.

ii. For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruising range of the aircraft for which she or he is certified.

iii. Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.

iv. For all aircraft with cruising range over 1000 Kms, find the name of the aircraft and the average salary of all pilots certified for this aircraft.

v.   Find the names of pilots certified for some Boeing aircraft.

vi. Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

vii. A customer wants to travel from Madison to New York with no more than two changes of flight. List the choice of departure times from Madison if the customer wants to arrive in New York by 6 p.m.

viii.   Print the name and salary of every non-pilot whose salary is more than the average salary for pilots.

PROGRAM 6. ORDER PROCESSING DATABASE

Consider the following relations for an Order Processing database application in a company.

CUSTOMER (CUST #: int, cname: String, city: String)

ORDER (order #: int, odate: date, cust #: int, ord-Amt: int)

ITEM (item #: int, unit-price: int)

ORDER-ITEM (order #: int, item #: int, qty: int)

WAREHOUSE (warehouse #: int, city: String)

SHIPMENT (order #: int, warehouse #: int, ship-date: date)

i.   Create the above tables by properly specifying the primary keys and the foreign keys and the foreign keys.

ii. Enter at least five tuples for each relation.

iii. Produce a listing: CUSTNAME, #oforders, AVG_ORDER_AMT, where the middle column is the total numbers of orders by the customer and the last column is the average order amount for that customer.

iv. List the order# for orders that were shipped from all warehouses that the company has in a specific city.

v.   Demonstrate how you delete item# 10 from the ITEM table and make that field null in the ORDER_ITEM table.

PROGRAM 7. BOOK DEALER DATABASE

The following tables are maintained by a book dealer:

AUTHOR(author-id: int, name: String, city: String, country: String)

PUBLISHER(publisher-id: int, name: String, city: String, country: String)

CATALOG (book-id: int, title: String, author-id: int, publisher-id: int, category-id: int, year: int, price: int)

CATEGORY(category-id: int, description: String)

ORDER-DETAILS(order-no: int, book-id: int, quantity: int)

i.   Create the above tables by properly specifying the primary keys and the foreign keys.

ii. Enter at least five tuples for each relation.

iii. Give the details of the authors who have 2 or more books in the catalog and the price of the books in the catalog and the year of publication is after 2000.

iv. Find the author of the book which has maximum sales.

v.   Demonstrate how you increase the price of books published by a specific publisher by 10%.

PROGRAM 8. STUDENT ENROLLMENT DATABASE

Consider the following database of student enrollment in courses and books adopted for each course.

STUDENT (regno: String, name: String, major: String, bdate: date)

COURSE (course #: int, cname: String, dept: String)

ENROLL (regno: String, cname: String, sem: int, marks: int)

BOOK_ADOPTION (course #: int, sem: int, book-ISBN: int)

TEXT(book-ISBN:int, book-title:String, publisher:String, author:String)

i.   Create the above tables by properly specifying the primary keys and the foreign keys.

ii. Enter at least five tuples for each relation.

iii. Demonstrate how you add a new text book to the database and make this book be adopted by some department.

iv. Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.

v.   List any department that has all its adopted books published by a specific publisher.

PROGRAM 9: MOVIE DATABASE

Consider the schema for Movie Database:

ACTOR(Act_id, Act_Name, Act_Gender)

DIRECTOR(Dir_id, Dir_Name, Dir_Phone)

MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)

MOVIE_CAST(Act_id, Mov_id, Role)

RATING(Mov_id, Rev_Stars)

Write SQL queries to

i.   List the titles of all movies directed by 'Hitchcock'.

ii. Find the movie names where one or more actors acted in two or more movies.

iii. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).

iv. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.

v.   Update rating of all movies directed by 'Steven Spielberg' to 5.

PROGRAM 10:COLLEGE DATABASE

Consider the schema for College Database:

STUDENT(USN, SName, Address, Phone, Gender)

SEMSEC(SSID, Sem, Sec)

CLASS(USN, SSID)

SUBJECT(Subcode, Title, Sem, Credits)

IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

i.   List all the student details studying in fourth semester 'C' section.

ii. Compute the total number of male and female students in each semester and in each section.

iii. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.

iv. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.

v.   Categorize students based on the following criterion:

If FinalIA = 17 to 20 then CAT = 'Outstanding'

If FinalIA = 12 to 16 then CAT = 'Average'

If FinalIA< 12 then CAT = 'Weak'

Give these details only for 8th semester A, B, and C section students.

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Sem	4th			
Course Title:	**Analysis and Design of Algorithms**			
Course Code:	**19CS4PCADA**			
L-T-P:	3-0-1	**Total Credits:**		4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction:** What is an Algorithm? Fundamentals of Algorithmic Problem Solving, **Fundamentals of the Analysis of Algorithm Efficiency**: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Nonrecursive Algorithm, Mathematical Analysis of Recursive Algorithms.	7	Text Book 1 Chapter 1 - 1.1, 1.2, Chapter 2 - 2.1, 2.2, 2.3, 2.4
2	**Brute Force and Exhaustive Search:** Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Exhaustive Search, Depth-First Search and Breadth-First Search **Decrease-and-Conquer**: Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease-by-a-Constant-Factor Algorithms: Binary Search, Variable-Size-Decrease Algorithms: Computing Median and the Selection Problem	8	Text Book 1 Chapter 3 - 3.1, 3.2, 3.4, 3.5 Chapter 4 - 4.1, 4.2, 4.3, 4.4, 4.5
3	**Divide-and-Conquer**: Mergesort, Quicksort, Multiplication of Large Integers and Strassen's Matrix Multiplication **Transform-and-Conquer**: Presorting, Heaps and Heapsort, Horner's Rule	8	Text Book 1 Chapter 5 - 5.1, 5.2, 5.4 Chapter 6 - 6.1, 6.4, 6.5
4	**Dynamic Programming**: Three Basic Examples, The Knapsack Problem [Without Memory Functions], Warshall's and Floyd's Algorithms **Greedy Technique**: Prim's Algorithm, Kruskal's Algorithm [Without disjoint subsets and Union Find algorithms], Dijkstra's Algorithm	8	Text Book 1 Chapter 8 - 8.1, 8.2, 8.4 Chapter 9 - 9.1, 9.2, 9.3
5	**Coping with the Limitations of Algorithm Power:** Backtracking: n-Queens Problem, Subset-Sum Problem, **Branch-and-Bound** : Knapsack Problem, Traveling Salesman Problem **NP-Completeness**: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, **NP-Complete Problems**: The clique problem, The vertex cover problem, **Approximation Algorithms:** The vertex-cover problem	8	Text Book 1 Chapter 12 - 12.1, 12.2 Text Book 2 Chapter 34 - 34.1, 34.2, 34.3, 34.5-34.5.1, 34.5.2, 35:35.1

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Third Edition	Pearson	2011
2.	Introduction to Algorithms	Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein	Third Edition	The MIT Press	2009

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Computer Algorithms	Ellis Horowitz, SatrajSahni and Rajasekharam	2nd Edition	University Press Pvt. Ltd,	2009
2.	Analysis and design of Algorithms	Padma Reddy,		Sri Nandi Publications	2009

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Introduction to Design & Analysis of Algorithms	K. Raghava Rao		Smashwords	2013	https://www.smashwords.com/books/view/365630
2.	Data structures and Algorithm Analysis in C++	Allen Weiss	Fourth edition	Pearson education	2014	http://iips.icci.edu.iq/images/exam/DataStructuresAndAlgorithmAnalysisInCpp_2014.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Algorithms-design-and-analysis-part-1-coursera	Coursera	2016	https://www.mooc-list.com/course/algorithms-design-and-analysis-part-1-coursera
2.	Design and Analysis of Algorithms	NPTEL	2015	https://onlinecourses.nptel.ac.in/noc15_cs02/preview

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **analyze** time complexity of Recursive and Non-recursive algorithms using asymptotic notations.
CO2	Ability to **design** efficient algorithms using various design techniques.
CO3	Ability to **apply** the knowledge of complexity classes P, NP, and NP-Complete and prove certain problems are NP-Complete
CO4	Ability to **conduct** practical experiments to solve problems using an appropriate designing method and find time efficiency.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3													
CO2			3												3
CO3	1														
CO4				3											

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**20**
QUIZ/AAT	**ONE**	**5**
Lab Component	**Two Lab Tests**	**25**
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Instructions:

a) Lab faculty should discuss the topics from Text Book 1(Introduction to the Design and Analysis of Algorithms- Anany Levitin- Third Edition)

    a. 2.6 -Empirical Analysis of Algorithm

    b. 2.7- Algorithm Visualization

a) Design, develop and implement the specified algorithms for the following problems

    a. Using any programming Language in LINUX / Windows environment. But preferably C language and on LINUX environment.

b) For sorting and searching problems,

    a. The program should allow both manual entry of the array elements and also reading of array elements using random number generator.

    b. Plot a graph of the time taken versus N using MS Excel and paste the same in the record.

    c. Lab Record - Handwrite the Algorithm, Program and the output

Lab Program	Unit #	Program Details
1	1	Write a recursive program to a. Solve Towers-of-Hanoi problem b. To find GCD
2	2	Implement Recursive Binary search and Linear search and determine the time required to search an element. Repeat the experiment for different values of N and plot a graph of the time taken versus N.
3	2	Sort a given set of N integer elements using Selection Sort technique and compute its time taken. Run the program for different values of N and record the time taken to sort.
4	2	Write program to do the following: a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
5	2	Sort a given set of N integer elements using Insertion Sort technique and compute its time taken.

6	2	Write program to obtain the Topological ordering of vertices in a given digraph.
7	2	Implement Johnson Trotter algorithm to generate permutations
8	3	Sort a given set of N integer elements using Merge Sort technique and compute its time taken. Run the program for different values of N and record the time taken to sort.
9	3	Sort a given set of N integer elements using Quick Sort technique and compute its time taken
10	3	Sort a given set of N integer elements using Heap Sort technique and compute its time taken.
11	4	Implement Warshall's algorithm using dynamic programming.
12	4	Implement 0/1 Knapsack problem using dynamic programming.
13	4	Implement All Pair Shortest paths problem using Floyd's algorithm.
14	4	Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
15	4	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskals algorithm.
16	4	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
17	5	Implement "Sum of Subsets" using Backtracking. "Sum of Subsets" problem: Find a subset of a given set S = {s1,s2,……,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S = {1,2,5,6,8} and d = 9 there are two solutions {1,2,6} and {1,8}. A suitable message is to be displayed if the given problem instance doesn't have a solution.
18	5	Implement "N-Queens Problem" using Backtracking.

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Sem.	4th		
Course Title:	Operating Systems		
Course Code:	19CS4PCOPS		
L-T-P:	3-1-0	Total Credits:	4

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction**: What Operating Systems Do?, Computer System Architecture, Operating System Structure, Operating System Operations **System Structures**: User Operating system interface, system Calls, Types of System calls, System programs, Operating System Structure, System boot. **Process Concept**: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication.	7	Book 1: 1.1, 1.3-1.5 Book 1: 2.2-2.5, 2.7, 2.10 Book 1: 3.1-3.4
2	**Multithreaded Programming**: Overview, Multi-core Programming, Multithreading Models, Implicit Threading, Threading Issues. **Process Scheduling**: Basic concepts, Scheduling Criteria, Scheduling Algorithms. Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.	8	Book 1: 4.1-4.3, 4.5-4.6 Book 1: 5.1-5.6
3	**Synchronization**: Background, Critical Section Problem, Mutex locks, Semaphores, Classic Problems of Synchronization. **Deadlocks**: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery from deadlock.	8	Book 1: 6.1,6.2,6.5-6.7 Book 1: 7.1-7.7
4	**Memory management strategies** :Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table **Virtual Memory Management**: Background, Demand paging, Copy on write, Page replacement algorithms, Allocation of frames, Thrashing.	8	Book 1: 8.1-8.6 Book 1: 9.1-9.6
5	**Implementing File-system**: File-System Structure, File-System Implementation, Directory Implementation, Allocation methods, Free-space management. **Mass-storage structure**: Disk Structure, Disk Attachment, Disk Scheduling. **System Protection**: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix.	8	Book 1: 11.1-11.5 Book 1: 12.1-12.4 Book 1: 14.1-14.5

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Operating System Concepts	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne	9th Edition	John Wiley &Sons, Inc.	2012.

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Modern Operating System3	Andrew S. Tanenbaum	3rd Edition	Prentice Hall	2007
2.	Operating System: Internals and Design Principles	William Stallings	8th Edition	Prentice Hall	2014
3.	Schaum's Outline of Operating Systems (Schaum's Outline Series)	J. Archer Harris	Kindle Edition	McGraw-Hill	2001

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Operating Systems Guide	Tim Bower	-	Kansas State Polytechnic	2009	http://faculty.salina.k-state.edu/tim/ossg/
2.	Operating Systems Course Notes	Dr. John T.Bell	-	University of Illinois Chicago	2006 & 2013	https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/index.html
3.	Schaum's Outline of Operating Systems (Schaum's Outline Series)	J. Archer Harris.	[Kindle Edition]		2002	http://www.naturligtraw.com/schaum-s-outline-of-operating-systems.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Introduction to operating system	Coursera		www.coursera.org/lecture/technical-support-fundamentals/module-introduction-I3n9l
2.	Introduction to operating system	IIT, Madras	2017	https://onlinecourses.nptel.ac.in/noc17_cs29/preview
3.	Introduction to operating system	Udacity Georgia Tech		in.udacity.com/course/introduction-to-operating-systems--ud923

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to Apply Various Process Scheduling Algorithms, Disk Scheduling algorithms, Page replacement algorithms and Deadlock detection and avoidance techniques for providing Operating System functionalities
CO2	Ability to Analyse various process management concepts (including scheduling, synchronization and deadlocks), Memory Management strategies and Design considerations of file system.
CO3	Ability to Demonstrate the Basic Concepts of Operating System.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3														
CO2		3													2
CO3			2						1	1					2

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	2	40
QUIZ	1	5
Lab Component	--	--
Alternate Assessment Tool	1	5
Total		50

E   Tutorial Plan *(if applicable)*

Tutorial #	Unit #	Topic
1	I	Group Assignment on different functionalities of Operating system Book 1, Chapter 1 Exercise 1.2, 1.6, 1.13, 1.27-1.30 Chapter 2 Exercise 2.20, 2.25
2	I	Problems on Inter process communication Book 1 Chapter 3 Exercise 3.5, 3.6, 3.18, 3.19
3	II	Problems on Process Scheduling Book 1 Chapter 3 Exercise 3.19, 3.20
4	II	Problems on Process Scheduling Book 1 Chapter 4.18, 4.24
5	II	Problems on Real time CPU Scheduling Book 1 Chapter 6 Exercise 6.12, 6.14, 6.16, 6.31
6	III	Problems on Synchronization Book 1 Chapter 5 Exercise 5.8, 5.17, 5.23
7	III	Problems on Deadlock detection Book 1 Chapter 7 Exercise 7.8, 7.9, 7.18
8	III	Problems on Deadlock Avoidance Book 1 Chapter 7 Exercise 7.22,7.23
9	IV	Problems on Contiguous Memory allocation Book 1 Chapter 8 Exercise 8.11, 8.20, 8.21
10	IV	Problems on Page replacement Book 1 Chapter 9 Exercise 9.4, 9.8, 9.11
11	V	Problems on Disk scheduling Book 1 Chapter 10 Exercise 10.11, 10.12, 10.16
12	V	Problems on Disk scheduling Book 1 Chapter 10 Exercise 10.7, 10.9

F   Laboratory Plan *(if applicable)*

G   Alternate Assessment Tool Plan *(if applicable)*

Demonstrate the basic concepts of Operating system like Scheduling, Synchronization, Deadlock, Page replacement and Disk Scheduling algorithms using any Programming Language and present the same along with the report.

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Course Code	19IC3HSCPH / 19IC4HSCPH	Course Name	Constitution of India, Professional Ethics and Human Rights
Credits	01	L-T-P-S	1-0-0-0

Total Hours: 12

Course Objectives:

1. To educate students about the Supreme Law of the Land.
2. To value human dignity and to save the liberties of the people against discriminations.
3. To raise awareness and consciousness of the issues related to the profession and discuss the issue of liability of risks and safety at work place.

UNIT-1

Introduction to Indian Constitution   [03 hours]

Historical Background of the Indian Constitution. Framing of the Indian constitution: Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India, Fundamental Rights and its limitations. Fundamental Duties and their significance. Directive Principles of State Policy: Importance and its relevance. Case Studie

UNIT-2

Union Executive and State Executive   [02 hours]

The Union Executive – The President and The Vice President, The Prime Minister and The Council of Ministers.The Union Parliament –LokSabha&RajyaSabha.
The Supreme Court of India.
State Executive – The Governors, The Chief Ministers and The Council of Ministers. The State Legislature – Legislative Assembly and Legislative Council. State High Courts.

UNIT-3

Election Commission of India, Amendments and Emergency Provisions   [02 hours]

Election Commission of India – Powers & Functions – Electoral Process in India.
Methods of Constitutional Amendments and their Limitations.
Important Constitutional Amendments – 42nd, 44th, 61st, 74th, 76th, 77th, 86th and 91st.
Emergency Provisions. Case Studies

UNIT-4

Special Constitutional Provisions/ Human Rights   [02 hours]

Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes, Women & Children. Case Studies.
Human Rights/values – Meaning and Definitions, Legislative Specific Themes in Human
Rights and Functions / Roles of National Human Rights Commission of India. Human Rights
(Amendment Act) 2006

UNIT-5

Professional Ethics   [03 hours]

Scope and Aims of Engineering Ethics, Responsibilities of Engineers and impediments to responsibilities. Honesty, Integrity and Reliability; Risks – Safety and Liability in Engineering. Case Studies.

At the end of the course, the student will have the ability to

CO1	Understand and explain the significance of Indian Constitution as the Fundamental Law of the Land.	**Remember**
CO2	Analyse the concepts and ideas of Human Rights.	**Analyse**
CO3	Apply the practice of ethical responsibilities and duties to protect the welfare and safety of the public.	**Application**

Text Books:

1. "An Introduction to Constitution of India and Professional Ethics" by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
2. "Constitution of India &Professional Ethics& Human Rights" by Phaneesh K. R., Sudha Publications, 10th edition, 2016.

Reference Books:

1. "V.N. Shukla's Constitution of India" by Prof (Dr.) Mahendra Pal Singh (Revised), Eastern Book Company, Edition: 13th Edition, 2017, Reprint 2019.
2. "Ethics in Engineering" by Martin, W. Mike.,Schinzinger, Roland., McGraw-Hill Education; 4th edition (February 6, 2004).

E-Book:

1. https://books.google.co.in/books/about/Constitution_of_India_and_Professional_E.html?id=VcvuVt-d88QC Constitution of India and Professional Ethics, by G.B. Reddy and MohdSuhaib, I.K. International Publishing House Pvt. Ltd., 2006.
2. http://www.scribd.com/doc/82372282/Indian-Constitution-M-Raja-Ram-2009#scribd Indian Constitution, by M. Raja Ram, New Age International Pvt. Limited, 2009.

Course Outcomes and Programme outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1						✔						
CO2						✔						
CO3								✔				

Correlation between programme outcome and course outcome:

Programme Outcome	Course Outcome	Blooms Taxonomy
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. **PO8.Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**CO1** Understand and explain the significance of Indian Constitution as the Fundamental Law of the Land. **CO2** Analyse the concepts and ideas of Human Rights. **CO3** Apply the practice of ethical responsibilities and duties to protect the welfare and safety of the public.	Remember Analyse Application

SEE Exam Question paper format

SEE	Online Examination	
Pattern	**50 Multiple Choice Questions**	**Total Marks 50 X 2 = 100**

CIE format	
Type of Assessment	**Marks**
AAT-1 **AAT-2**	**5 Marks** **5 Marks**
Test 1,2,3 (Online Test) **Multiple Choice Questions**	**20 Marks** **20 Marks** **20 Marks**

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Academic Year	Aug-Dec 2019/Jan-May 2020	Sem.	4th	
Course Title:	Seminar Technical / Internship			
Course Code:	19CS4SRSTI			
L-T-P:	0-0-1	Total Credits:	1	

A   Syllabus

Introduction: Technical Seminar Based on,

i. Summer/Winter Internship (with any NGO or company during mandatory internship of at least one week (at least five days) during the vacation period of 1st, 2nd and 3rd Semester) or

ii. Research paper presentation based on Technology Trends in Healthcare, Finance etc.

Sl. No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
1	Ability to apply domain knowledge during the course of internship or research paper presentation	3												3		
2	Ability to work independently and in a collaboration/multidisciplinary environment.							2		3						
3	Ability to demonstrate effective verbal and written communication skills										3					
4	Ability to exhibit integrity and ethical behavior while research paper presentation or carrying out the internship on site.								3							
5	Ability to allocate time effectively and manage to complete the work allotted within appropriate time											3				

B Proposed Assessment Plan (for 50 marks of CIE)

Evaluation will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

Criteria	Very Good	Good	Average	Poor
Ability to apply domain knowledge during the course of internship or research paper presentation (10M)	Ability to apply domain knowledge completely during the course of internship or research paper presentation (10M)	Ability to apply domain knowledge moderately during the course of internship or research paper presentation (7M)	Ability to apply domain knowledge partially during the course of internship or research paper presentation (5M)	Unable to apply domain knowledge during the course of internship or research paper presentation (2M)
Ability to work independently and in a collaboration/ multidisciplinary environment. (10M)	Able to work independently and in a multidisciplinary environment. (10M)	Able to work independently with minimal guidance and in a multidisciplinary environment. (7M)	Able to work independently with more guidance and in a multidisciplinary environment. (5M)	Unable to work independently without guide support and in a multidisciplinary environment. (2M)
Ability to demonstrate effective verbal and written communication skills. (10M)	Able to demonstrate effective oral and written communication skills (10M)	Able to demonstrate oral and written communication skills moderately. (7M)	Able to demonstrate oral and written communication skills minimally. (5M)	Unable to demonstrate effective verbal and written communication skills (2M)
Ability to exhibit integrity and ethical behavior while research paper presentation or carrying out the internship on site and for the preparation of report. (10M)	Able to effectively exhibit integrity and ethical behaviour while presenting the selected module and for the preparation of technical report. (10M)	Able to moderately exhibit integrity and ethical behaviour while presenting the selected module and for the preparation of technical report. (7M)	Able to partially exhibit integrity and ethical behaviour while presenting the selected module and for the preparation of technical report. (5M)	Unable to exhibit integrity and ethical behaviour while presenting the selected module and for the preparation of technical report. (2M)
Ability to allocate time effectively and manage to complete the work allotted within appropriate time	Able to allocate time effectively and complete all the work within appropriate time. (5M)	Able to allocate time effectively and complete most of the work within appropriate time. (4M)	Able to allocate time effectively and manage to complete the work (3M)	Unable to use time effectively and complete the work on time.(1M)

C SEE Exam (for 50 Marks)

Seminar Technical / Internship evaluation is will be carried out by External examiner along with internal faculty.

Sem	4th		
Course Title:	**Project Work-2**		
Course Code:	**19CS4PWPW2**		
L-T-P:	**0-0-2**	**Total Credits:**	**2**

A Introduction

1. Database Application Development - Under this project work, student should develop back end data base table for any chosen data base applications. It can be extension of 3rd sem. project with back end connection.

2. Front end can be either Visual basic or C# or Java framework. Tables developed should be more than six database table. Students can form a group with minimum of two and maximum of four.

3. Teacher allotted for project work to students should teach students back end technologies like Oracle and front-end technologies like Visual during Lab hours as per the allotment.

4. Teacher allotted for project work should guide the students in choosing the topic and towards carrying out project work and complete the evaluation of assigned students.

5. The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

B Course Outcomes

At the end of the course the student will be able to

CO1	Ability to apply practical knowledge and latest tools usage along with project development.
CO2	Ability to design and develop a project using Database technologies to solve societal problems.
CO3	Ability to report and present the implemented solutions in a team

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3				3										
CO2	3	3	3	2	3	2	2	2				1	1	3	2
CO3								2	3	3					

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	---	--
QUIZ	---	--
Lab Component	---	50
Alternate Assessment Tool	---	--
Total		50

Rubrics for Project Evaluation:

Criteria	Exemplary	Proficient	Partially Proficient	Points
Form Layout	(10) The Management System has an exceptional design, attractive and usable layout. It is easy to locate all important elements.	(6) The Management System have an attractive design and usable layout. It is easy to locate all important elements.	(4) The Management System have a usable design layout, but may appear busy or boring. It is easy to locate most of the important elements.	__ / 10
ER Diagram	(10) Complete ER diagram with details of Constraints, Cardinality ratio, different type's entities, participation, Keyes, relationship and attributes.	(6) Partial ER diagram with details of only Cardinality ratio, different type's entities, participation, Keys, relationship and attributes.	(4) Incomplete ER diagram with only entities, relationship, keys and attributes.	__ / 10
Schema diagram	(5) Complete Schema diagram with clear identification of all relationships	(3) Partial Schema diagram with identification of only few relationships	(2) Incomplete Schema diagram with improper identification of relationships	___ / 5
Normalized tables	(5) Complete normalization of all the tables	(3) Normalization of only few tables	(2) Tables has not been normalized.	___ / 5
Validation of Form fields	(5) Validations have been carried out for all form fields completely in all the forms.	(3) Most of the validations have been carried out for all form fields completely in all the forms.	(2) Few of the validations has been carried out for the form fields in the forms.	___/5
Report	(5) Clear and Effective writing and adherence to appropriate style guidelines	(3) Writing that is clear and effective for the most part and minor errors in adherence to appropriate style guidelines	(2) Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines	__/5
Oral communication / Presentation	(5) Clear and effective communication	(3) Communication is clear	(2) Unclear communication	___/5
Participation in Discussions	(5) Provided many good ideas; inspired others; clearly communicated ideas, needs, and feelings.	(3) Participated in discussions; on some occasions, made suggestions.	(2) Listened mainly; Rarely spoke up, and ideas were off the mark.	___/5
			Total	___/50

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Project Topics for Database Application Development:

Online shopping system, College ERP (Small Scale), Library Management System, Banking Application, Hostel Management System, Event Management, Online Food Delivery, Timed Quiz, Gym management , matrimonial website, Pharmacy Management System, Railway reservation, Department level Course End Survey Tool, Alumni Survey Submission System, Class Room Discussion Between Teacher and Student, Notification Dashboard, Students SEE exam results, CIE Marks and attendance, Department Faculty Self-Assessment Report Submission System; Department Faculty Self–Appraisal form Submission System; College TEQIP student project proposal submission system; College TEQIP Faculty Workshop/Conference/Seminar Application Submission System; College Exam Application Form Submission System; Placement management System (Company details, Company schedules on presentation, exams, placed students details);

Note: Apart from the above mentioned project topics if student groups come up with any innovative project ideas which are useful for the college academic purpose will be considered based on the approval and acceptance from class teacher.

For Front-end tool (for Form Design): Visual basic or C# or Java framework or any relevant drag-drop from design tool for front end design.

Back –end tool (for database table creation): Oracle or any relevant tool

Note: At least for three users Login form, at least four main forms which has functionality for insert, delete, search, update and view the data base tables

Sl. No	Week	Activity	Content deliverables by the assigned teacher
1	1st	Formation of groups. Note: Student groups of size 2 or 3 or 4	Introduction of front end frameworks such as Visual basic or C# or Java framework
2	2nd	Project topic selection by each group	**Front-end development using Visual C#** Focus of Visual C# is only on learning to develop front-end i.e., **form design** using the toolbox. Students will learn the basic coding to handle events. Demonstration of Visual C# lab programs. Adding two numbers, Finding Largest of three numbers
3	3rd	Presentation: Student and Project topic introduction by each group with ER diagram	Student USN validation Collect Student Information (USN, Name, Department Name(Combo Box) and Semester (Radio Button) Using Form And Display it on Message Box Reading data from already existing database table and displaying it using form grid. Note: Database table should contain Student name, USN, Department name and Semester.
4	4th 5th and 6th	Front-end Design Layout of the Forms	Insert the new record into the existing database table by accepting the new record information through form and Update any of the existing database record. Note: Database table should contain Student name, USN, Department name and Semester.

5	7th	Presentation on Front-end Design by each group	Delete the existing record from the database table against USN by accepting it through the form text box and Search the student database records.
6	8th and 9th	Back end design of the project tables with schema diagram, Design and Development of connecting among different web pages	Demonstration of for connecting front end with back end database system
7	10th	Presentation of Normalized tables with front-end back-end connectivity.	
8	11th	Complete Project Work Demonstration by each group	
9	12th	Project Report Preparation	

G   SEE Exam (50 Marks)

Evaluation of Projects carried out by students from External examiner along with internal faculty.

Sem	4th		
Course Title:	**Cultural Activity (Music/Dance etc.)**		
Course Code:	**19CS4NCNC4**		
L-T-P:	**0-0-0**	**Total Credits:**	**ZERO PASS / FAIL**

A **Introduction**

- Student can participate in any of the cultural activities such as Music, dance conducted by college or any other institute.

- Student should produce participation certificate for clearing this mandatory course.
  Note: If student is unable to participate in outside cultural activities then department Head should take care of conducting any small cultural event (like Essay, Debate etc.) of one or two day event in the college.

- Physically challenged students can produce participation certificate of any technical/cultural events conducted by college/department clubs.

B **Course Outcomes**

At the end of the course the student will be able to

CO1	Able to reflect creatively on artistic and cultural processes of the society.
CO2	Demonstrate characters of individuality and teamwork in both competition and practice.

C **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3									
CO2									3						

D **Assessment Plan (for 50 marks of CIE)**

CATEGORY	MARKS (RANGE)	CULTURAL ACTIVITIES
L1	90 (90-100)	Winning Certificates at International/National/Zonal Level Competitions.
L2	80 (80-89)	Winning Certificates at State and University Level Competitions
L3	70 (70-79)	• Winning Certificates/ at Inter-Collegiate competitions. • Representing college team Organizing • National/ State/University level events. • Core Committee of techno cultural activity. • Debating society (Adjudicator, Secretary, and President). • NGO activity with registered NGO recognized by the Institution.
L4	60 (60-69)	Organizing Inter –Collegiate/ College level Events(Organizer and volunteers)
L5	50 (50-59)	• Participation in International/National/ Zonal/State//University Level Events. • NGO activity With registered NGO recognized by the institution(Participation only)
L6	40 (40-49)	Participation in Inter-Collegiate /College level events/ Blood donation /NGO/ Personality development Programs

E **SEE Exam Question paper**
Student should produce participation certificate for clearing this mandatory course.

FOURTH SEMESTER B.E COURSE

(Common to All Branches)

Course Title	Additional Mathematics-II	Course Code	19MA4IMMAT
Credits	00	L – T – P	3 – 1 – 0
Contact hours	48 hours (36L+12T)	IV semester Lateral Entry students	

Prerequisites: Basic concepts of Trigonometry, Trigonometric formulas, concept of differentiation, concept of integration.

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as Laplace Transforms, Solution of ordinary differential equations using Laplace Transforms, vector integration, computation of area and volume using double and triple integrals respectively.

UNIT-1

LAPLACE TRANSFORMS [9 Hours]

Laplace transforms of standard functions. Properties and problems. Laplace Transform of Periodic functions with plotting, unit step function and dirac-delta function.

(7L+2T)

UNIT-2

INVERSE LAPLACE TRANSFORMS [10 Hours]

Inverse Laplace transforms of standard functions. Properties and problems. Solution of ODE- Initial and Boundary value Problems.

(7L+3T)

UNIT-3

DOUBLE INTEGRALS [11 Hours]

Evaluation of double integral. Change of order of integration. Change of variables to polar coordinates. Application: Area.

(8L+3T)

UNIT-4

TRIPLE INTEGRALS AND IMPROPER INTEGRALS [9 Hours]

Evaluation of triple integral. Application: Volume. Beta and Gamma functions-definition, relation between Beta and Gamma functions, properties and problems.

(7L+2T)

UNIT-5

VECTOR INTEGRATION [9 Hours]

Line integral, Green's theorem, Stokes' theorem and Gauss divergence theorem.

(7L+2T)

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On completion of the course, students will have the ability to:

Course Code	CO #	COURSE OUTCOME (CO)	PO
19MA4IMMAT	CO 1	Use Laplace transforms to solve differential equations.	1
	CO 2	Apply multiple integrals of plane figures to compute areas and volume.	
	CO 3	Use Gamma and Beta functions to evaluate integrals.	
	CO 4	Ability to understand the use of integral calculus in scalar and vector fields.	

Text Book:

1. Higher Engineering Mathematics, B. S. Grewal, 43rd edition, 2014, Khanna Publishers.

2. Higher Engineering Mathematics, B. V. Ramana, 2007, Tata McGraw Hill.

Reference Book:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Precise Textbook series, Vol. 1 and Vol. 2, 10th edition, 2014, Wiley- India.

2. Advanced Engineering Mathematics, 4th edition, 2011, by Dennis G. Zill and Cullen, Jones and Bartlett India Pvt. Ltd

E books and online course materials

1. Engineering Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001
   http://books.google.co.in/books/about/Engineering_Mathematics.html?id=FZncL- xB8dEC&redir_esc=y.

2. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.

3. http://ocw.mit.edu/courses/mathematics/ (online course material)

Online Courses:

1. https:// www.khanacademy.org/Math

2. https:// www.class-central.com/subject/math (MOOCS)

3. E-learning: www.vtu.ac.in

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B. M. S. College of Engineering, Bengaluru-19
Autonomous Institute, affiliated to VTU

Department of Computer Science and Engineering
Curriculum Design for UG

Academic Year of admission 2018-19

UG Syllabus from 5th to 6th Semester

Definition of Credit: 1Hr. Lecture (L) per week 1 credit; 2Hrs Tutorial (T) per week 1 credit; 2Hrs Practical per week 1 credit

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	5th
Course Title:	Artificial Intelligence			
Course Code:	20CS5PCAIP			
L-T-P:	3-0-1		Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction:** What is AI? Foundations and History of AI **Intelligent Agents:** Agents and environment, Concept of Rationality, The nature of environment, The structure of agents. **Problem-solving:** Problem-solving agents, Example problems, Searching for Solutions	7	**Text Book 1:** **Chapter 1-** 1.1, 1.2, 1.3 **Chapter 2-** 2.1, 2.2, 2.3, 2.4 **Chapter 3-** 3.1, 3.2, 3.3
2	**Uninformed Search Strategies**: Breadth First search, Depth First Search, Iterative deepening depth first search; **Informed Search Strategies**: Heuristic functions, Greedy best first search, A*search. **Heuristic Functions**	8	**Text Book 1:** **Chapter 3-** 3.4, 3.5, 3.6
3	**Logical Agents:** Knowledge–based agents, The Wumpus world, Logic, Propositional logic, Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. **First Order Logic:** Representation Revisited, Syntax and Semantics of First Order logic, Using First Order logic.	8	**Text Book 1:** **Chapter 7-** 7.1, 7.2, 7.3, 74, 7.5, 7.6, 7.7 **Chapter 8-** 8.1, 8.2, 8.3
4	**Inference in First Order Logic :**Propositional Versus First Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution	8	**Text Book 1:** **Caper 9-** 9.1, 9.2, 9.3, 9.4, 9.5
5	**Uncertain Knowledge and Reasoning:** **Quantifying Uncertainty:** Acting under Uncertainty, Basic Probability Notation, Inference using Full Joint Distributions, Independence, Baye's Rule and its use. Wumpus World Revisited **Probabilistic Reasoning**: Representing Knowledge in an Uncertain Domain, Semantics of Bayesian Networks, Exact and approximate inference in Bayesian Networks.	8	**Text Book 1:** **Chapter 13-**13.1, 13.2, 13.3, 13.4, 13.5, 13.6 **Chapter 14-** 14.1, 14.2, 14.4, 14.5

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence	Stuart J. Russell and Peter Norvig	Third	Pearson	2015

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1	Artificial Intelligence	Elaine Rich, Kevin Knight, Shivashankar B Nair	Third	Tata MCGraw Hill	2013
2	Artificial Intelligence o-	George F Luger	Fifth	Pearson Education	2009

E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1	Artificial Intelligence: Foundations of Computational Agents	David L. Poole and Alan K. Mackworth	Second	----	2017	https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Knowledge-Based AI: Cognitive Systems	UDACITY	2020	https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409
2.	Artificial Intelligence	NPTEL	2009	https://nptel.ac.in/courses/106/105/106105077/

B Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** knowledge of agent architecture, searching and reasoning techniques for different applications.
CO2	Ability to **analyze** Searching and Inferencing Techniques.
CO3	Ability to **design** a reasoning system for a given requirement
CO4	Ability to **conduct** practical experiments for demonstrating agents, searching and inferencing.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		1													3
CO3			2												
CO4				3											

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	20
QUIZ	ONE	5
Lab Component	Two Lab Tests + Continuous Evaluation	25
Alternate Assessment Tool	--	--
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Instructions:

a) Design, develop and implement the specified algorithms for the following problems using Python Language in LINUX / Windows environment. But preferably on LINUX environment

b) Lab Record - Handwrite the Algorithm and attach the printout of the Program and the output.

Note: The faculty in charge of Artificial Intelligence course of all the sections must come up with two to three test cases for the programs in the laboratory set at the beginning of the semester. The students are expected to write the algorithm /program to solve these test cases. Depending on the number of test cases executed by the student the evaluation for the week must be done.

Experiment #	Unit #	Name of Experiment	Remarks
1	1	Implement Tic –Tac –Toe Game.	
2	1	Solve 8 puzzle problem.	
3	2	Implement Iterative deepening search algorithm.	
4	2	Implement A* search algorithm.	
5	1	Implement vacuum cleaner agent.	
6	3	Create a knowledgebase using prepositional logic and show that the given query entails the knowledge base or not.	
7	3	Create a knowledgebase using prepositional logic and prove the given query using resolution	
8	3	Implement unification in first order logic	
9	3	Convert given first order logic statement into Conjunctive Normal Form (CNF).	
10	4	Create a knowledgebase consisting of first order logic statements and prove the given query using forward reasoning.	

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	50%
Create / Evaluate	25%

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DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem	5th
Course Title:	Computer Networks		
Course Code:	20CS5PCCON		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction**: Data Communications, Networks, Network Types, **Network Models:** Protocol Layering, TCP/IP Protocol Suite, OSI Model **Introduction to Physical Layer:** Data and signals **Digital Transmission, Bandwidth Utilization: Multiplexing and Spectrum Spreading**. Switching: Introduction, Circuit Switched Networks, Packet Switching	8	**Book1: 1.1-1.3, 2.1-2.3, 3.1, 4.1-4.3, 6.1-6.2, 8.1-8.3**
2	**Introduction to Data Link Layer.** **Error Detection and Correction**: Introduction, Block Coding, Cyclic Codes, Checksum **Data Link Control**: DLC Services, Data-Link Layer Protocols **Media Access Control.** Wired LANs: Ethernet-Ethernet Protocol, Standard Ethernet: Characteristics, Addressing	9	**Book1: 9.1-9.2, 10.1-10.4, 11.1-11.2, 12.1-12.3, 13.1, 13.2.1, 13.2.2**
3	**Introduction To Network Layer**: Network Layer Services, Packet Switching, Network Layer Performance, IPV4 Addresses **Network Layer Protocols:** Internet Protocol, ICMPV4, **Unicast Routing:** Introduction, Routing algorithms, **Unicast routing protocols:** Internet Structure, Routing Information Protocol (RIP) **Next Generation IP**: IPV6 Addressing, IPV6 Protocol, Transition from IPV4 to IPV6	9	**Book1: 18.1-18.4, 19.1-19.2, 20.1-20.2, 20.3.1, 20.3.2, 22.1-22.2, 22.4.**
4	Introduction to Transport Layer. Transport Layer Protocols **Transport Layer Protocols**: Introduction, User Datagram Protocol, Transmission Control Protocol.	7	**Book1: 23.1-23.2, 24.1-24.3**
5	**Introduction to Application Layer**: Introduction, Standard Client Server Protocols.	6	**Book1: 25.1, 26.1-26.6**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Data Communications and Networking	Behrouz A Forouzan	Fifth	McGraw Hill	2013

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Data and Computer Communication	William Stallings	Eight	Pearson Education	2008
2.	Computer Networks – A Systems Approach	Larry L. Peterson and Bruce S. Davie	Fourth	Elsevier	2007

E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	An Introduction to Computer Networks	Peter L Dordal	First	-	2020	http://intronetworks.cs.luc.edu/current/ComputerNetworks.pdf

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Computer Networks and Internet Protocols	NPTEL	2020	https://nptel.ac.in/courses/106105183/
2.	Network Protocols and Architecture	Coursera	2020	https://www.mooc-list.com/course/network-protocols-and-architecture-coursera

B **Course Outcomes**

At the end of the course the student will be able to

CO1	Apply the fundamentals of communication in networking aspects
CO2	Analyse the various protocols in Physical, Data link, Network, Transport and Application layers and their mechanisms.
CO3	Design functional aspects for network applications.
CO4	Develop programs that demonstrate the operations of physical, Data Link, Network, Transport or Application layers

C **CO-PO-PSO mapping**

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3													2	
CO2		3												2	
CO3			3											2	
CO4		2	2		3									2	

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**20**
QUIZ	**ONE**	**05**
Lab Component	**2 Lab Tests + Continuous Evaluation**	**25**
Alternate Assessment Tool	**--**	**-**
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

COMPUTER NETWORKS Lab - Plan of Activities

1. CYCLE 1: Exercises done using CISCO Packet Tracer
    CYCLE 2: Execution of Lab Programs using C/C++/Python
2. Execution of Lab programs and submission of lab record

Evaluation:

Lab Test 1 : 12 Marks – Writing and execution of lab programs
Lab Test 2 : 13 Marks – Writing and execution of lab programs

Note: Open ended questions will be framed by the course handling faculty of all sections and will be shared with the class during the commencement of the course.

Cycle 1:
  • Students should design a network based on the topology of nodes and requirements given. They should choose the suitable communication devices and simulate the topology.
  • Students should design a network, apply the learnt protocols and justify the usage

Cycle 2:
  • Students should design the network and justify the algorithm chosen to find the shortest path.
  • Students should deploy suitable transport layer protocol based on the given connection orientation.

Each of the above can be evaluated for 10 marks in the lab and will be included as part of the continuous evaluation process.

Experiment #	Unit #	Name of Experiment
CYCLE 1		
1	2	Creating a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices.
2	3	Configuring IP address to Routers in Packet Tracer. Explore the following messages: Ping Responses, Destination unreachable, Request timed out, Reply
3	3	Configuring default route to the Router
4	3	Configuring DHCP within a LAN in a packet Tracer
5	5	Configuring RIP Routing Protocol in Routers
6	5	Demonstration of WEB server and DNS using Packet Tracer

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		CYCLE 2
1	2	Write a program for error detecting code using CRC-CCITT (16-bits).
2	3	Write a program for distance vector algorithm to find suitable path for transmission.
3	3	Implement Dijkstra's algorithm to compute the shortest path for a given topology.
4	3	Write a program for congestion control using Leaky bucket algorithm.
5	4	Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.
6	4	Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

G   Alternate Assessment Tool Plan(*if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	30%
Apply / Analyze	50%
Create / Evaluate	20%

Academic Year	Aug-Dec 2020/Jan-May-2021	Sem	5th
Course Title:	Unix Shell and System Programming		
Course Code:	20CS5PCUSP		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**UNIX Architecture and Command Usage:** Unix Architecture, Features of UNIX, POSIX and the Single UNIX Specification, Internal and External Commands, Command Structure, Flexibility of Command Usage, Man Browsing the manual pages online **General Purpose Utilities:** cal, date, echo, printf, bc, script, Email basics, passwd, who, uname, tty, stty **The File System** The File, What's in a (File)name?, The Parent-Child Relationship, the HOME variable, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, ls, The UNIX File System **Handling Ordinary Files** cat, cp, rm, mv, more, the lp subsystem, file, wc, od, cmp, comm, diff, dos2unix and unix2dos, compressing and archiving files, gzip and gunzip, tar, zip and unzip	7	**Text Book 1 Chapter 2:** 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8 **Text Book 1 Chapter 3:** 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.9, 3.10, 3.11, 3.12, 3.13 **Text Book 1 Chapter 4:** 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12 **Text Book 1 Chapter 5:** 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 5.16, 5.17
2	**Essential Shell Programming:** Shell Scripts, read, Using command line arguments, exit and exit status of command, the logical operators && and || - conditional execution, the if conditional, using test and [ ] to evaluate expressions, the case conditional, expr, $0, while, for, set and shift, the here document(<<), trap, debugging shell scripts with set -x	9	**Text Book 1 Chapter 14** 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, 14.13, 14.14, 14.15, 14.16
3	**Basic File Attributes:** ls –l, the –d Option, File Ownership, File Permissions, chmod, Directory permissions, Changing file ownership **More File Attributes:** File Systems and Inodes, Hard Links, Symbolic Links and ln, the directory, umask, Modification and Access Times, find **Simple Filters:** The sample database, pr, head, tail, cut, paste, sort, uniq, tr, an example: displaying a word count list **Filters using Regular Expressions - grep:** grep, BRE introduction, ERE and egrep	7	**Text Book 1 Chapter 6** 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 **Text Book 1 Chapter 11** 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7 **Text Book 1 Chapter 12** 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, 12.10 **Text Book 1 Chapter 13** 13.1, 13.2, 13.3

4	**UNIX and ANSI Standards:** The ANSI C standard, the ANSI/ISO C++ Standard, Differences between ANSI C and C++, The POSIX Standards **UNIX and POSIX APIs:** The POSIX APIs, The UNIX and POSIX Development Environment, API common characteristics **UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs	7	**Text Book 2 Chapter 1** 1.1, 1.2, 1.3, 1.4 **Text Book 2 Chapter 5** 5.1, 5.2, 5.3 **Text Book 2 Chapter 7** 7.1, 7.2, 7.3, 7.4
5	**UNIX Processes:** **The Environment of a UNIX Process:** Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions **Process Control:** Introduction, Process Identifiers, fork(), vfork(), exit(), wait(), waitpid() **Interprocess Communication:** Introduction, Pipes, popen and pclose functions, FIFOs	9	**Textbook 3 Chapter 7** 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11 **Textbook 3 Chapter 8** 8.1, 8.2, 8.3, 8.4, 8.5, 8.6 **Textbook 3 Chapter 14** 14.1, 14.2, 14.3, 14.5

Prescribed Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1	Unix Concepts and Applications	Sumitabha Das	4th Edition	Tata McGraw Hill	1992
2	UNIX System Programming using C++	Terrance Chan	First Impression	Pearson Education	2008
3	Advanced Programming in the UNIX Environment	W. Richard Stevens	Fifth / Indian Reprint	Pearson Education	2001

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	UNIX & Shell Programming	M.G. Venkatesh Murthy	Second Impression	Pearson Education	2007
2.	The Complete Reference UNIX	Kenneth Rosen, Douglas Host, Rachel Klee, James Farber, Richard Rosinski	Second Edition, 6th Reprint	Tata McGRAW-HILL Edition	2008

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E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
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MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Linux Shell Scripting: A Project-Based Approach to Learning	Udemy	2020	https://www.udemy.com/course/linux-shell-scripting-projects/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **understand** the knowledge of UNIX Shell commands & UNIX System APIs and **apply** the functionality of the same.
CO2	Ability to **analyse** the given commands & shell programs, to identify the errors and generate the desired outputs.
CO3	Ability to **design** UNIX shell scripts and system programs, for the given requirements.
CO4	Ability to **conduct** experiments to **demonstrate** the various commands of UNIX Shell and System APIs.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												1		
CO2		3											1		
CO3			3										1		3
CO4					3								3		3

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**20**
QUIZ	**ONE**	**05**
Lab Component	**2 Lab Tests + Continuous Evaluation**	**25**
Alternate Assessment Tool	**--**	**---**
Total		**50**

E **Tutorial Plan** *(if applicable)*

F **Laboratory Plan** *(if applicable)*

Note:

i. Open ended questions should be designed by course teachers of all sections at the start of semester.

ii. Before lab Test-1, first set of open ended questions will be evaluated for 10 marks and will be included as part of the continuous evaluation process of lab

iii. Before lab Test-2, second set of open ended questions will be evaluated for 10 marks and will be included as part of the continuous evaluation process of lab.

Sl. No	Program	Unit No
1	Shell script to find if the given year is leap or not	2
2	Shell script to find the area of a circle	2
3	Shell script to check whether the number is zero/ positive/ negative	2
4	Shell script to find the biggest of three numbers	2
5	Shell script to find the factorial of a number	2
6	Shell script to compute the gross salary of an employee	2
7	Shell script to convert the temperature Fahrenheit to Celsius	2
8	Shell script to perform arithmetic operations on given two numbers	2
9	Shell script to find the sum of even numbers upto n	2
10	Shell script to print the combinations of numbers 123	2
11	Shell script to find the power of a number	2
12	Shell script to find the sum of n natural numbers	2
13	Shell script to display the pass class of a student	2
14	Shell script to find the Fibonacci series up to n	2
15	Shell script to count the number of vowels of a string	2
16	Shell script to check number of lines, words, characters in a file	3
17	Write a C/C++ program to that outputs the contents of its environment list	5
18	Write a C/C++ program to emulate the Unix **ln** command	3,4
19	Write a C/C++ POSIX compliant program that prints the POSIX defined Configuration options supported on any given system using feature test macros.	4
20	Write a C/C++ program which demonstrates Interprocess Communication between a reader process and a writer process. Use mkfifo, open, read, write and close apis in your program.	5

G   Alternate Assessment Tool Plan(*if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem	5th
Course Title:	**Software Engineering**			
Course Code:	**20CS5PCSEG**			
L-T-P:	**3-0-0**		Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction** FAQs about software engineering, Professional and ethical responsibility, **Software Process**es: Software Process models, Process Iteration, Process Activities, **Software requirements:** Functional and Non-functional requirements, User requirements, System requirements, Interface specification, The software requirements document.	8	**1** **Chapter 1 – 1.1,1.2** **Chapter 4- 4.1,4.2,4.3** **Chapter 6 – 6.1,6.2,6.3,6.4,6.5**
2	**Requirements engineering process**: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. **System models:** Context models, Behavioural models, Data models, Object models, Structured methods.	7	**1** **Chapter 7- 7.1,7.2,7.3,7.4** **Chapter 8 – 8.1,8.2,8.3,8.4,8.5**
3	**Architectural Design**: Architectural Design Decisions, System organization, Modular Decomposition styles, Control styles, **Object oriented design**: Objects and Object Classes, An object oriented design process, Design evolution.	7	**1** **Chapter 11- 11.1,11.2,11.3,11.4** **Chapter 14- 14.1,14.2,14.3**
4	**Project Management Concepts** The Management Spectrum, People, Product, Process and Project, The W5HH principle, Critical practices, **Estimation for Software Projects:** Software Project estimation, Decomposition Techniques, Empirical Estimation models, **Project Scheduling**: Basic Concepts, Project Scheduling, Defining a Task set for the software Project, Defining a Task network, Scheduling, **Risk Management**: Reactive versus proactive strategies, Software Risks, Risk identification , Risk mitigation, monitoring and management, The RMMM plan.	9	**2** **Chapter 24 – 24.1,24.2,24.3, 24.4,24.5,24.6,24.7** **Chapter 26- 26.5,26.6,26.7** **Chapter 27 – 27.1,27.2,27.3, 27.4,27.5** **Chapter 28 –28.1,28.2,28.3, 28.6,28.7**
5	**Rapid software development** Agile methods, Extreme programming, Rapid application development, **Software evolution:** Legacy system evolution **Verification and Validation:** Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods, **Software testing:** System testing, Component testing, Test case design, Test automation.	8	**1** **Chapter 17 – 17.1,17.2,17.3** **Chapter 21- 21.4** **Chapter 22- 22.1,22.2,22.3, 22.4** **Chapter 23-23.1,23.2,23.3, 23.4**

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	"Software Engineering"	Ian Somerville	8th Edition	Pearson Education	2007
2.	"Software Engineering: A Practitioners Approach	Rogers S Pressman	7th edition	MCGrawHill	2007

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Software Engineering theory and Practice	shari Lawrence Pfleeger, Joanne m Atlec	3rd edition	Pearson Education	2006
2.	Software Engineering Principles and Practice	Waman S Jawadekar	-	Tata McGraw Hill	2004

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	"Fundamentals of Software Engineering"	Rajib Mall	3rd edition			https://www.docdroid.net/gzKpqAI/software-engineering-rajib-mall.pdf
2.	"Software Engineering :A practitioner's Approach"	Roger. S. Pressman	7th edition	Tata McGraw Hill		http://dinus.ac.id/repository/docs/ajar/RPL-7th_ed_software_engineering_a_practitioners_approach_by_roger_s._pressman_.pdf
3.	"An Integrated approach to Software Engineering"	Pankaj Jalote.	3rd edition	springer		https://www.academia.edu/4660479/an_integral_approach_to_software_engineering_BY_PANKAJ_JALOTE

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	"Software development process and methodologies"	Coursera	Feb 2020	https://www.coursera.org/learn/software-processes
2.	"Software Engineering basics"	Tutorials point	2017	https://www.youtube.com/redirect?v=4b1D1QFEel0&event=video_description&q=https%3A%2F%2Fwww.tutorialspoint.com%2Fvideotutorials%2Findex.htm&redir_token=sFZ6UAOTKFDICUwd3dwlKU0ize98MTU4MjAwODY4NEAxNTgxOTIyMjg0.
3.	"Software Engineering"	IIT Kharagpur	July 2019	https://swayam.gov.in/nd1_noc19_cs69/preview

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** Software Engineering Design Techniques and practices for developing Software.
CO2	Ability to **analyze** the various requirements, design and Testing Techniques to select the appropriate techniques for the software system.
CO3	Ability to **Design** Models for different phases of software development to solve real world problems.
CO4	Ability to Manage **Projects** by Estimating cost and time required for developing the Software Product.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3							2					3		
CO2		3											3		
CO3			3										3		
CO4											3		3		

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	ONE	**05**
Lab Component	--	**-**
Alternate Assessment Tool	Case study, Assignments will be given to the student where the student has to draw up the complete software life cycle plan.	**05**
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

G   Alternate Assessment Tool Plan *(if applicable)*

Case Study/Assignment: The student has to select the topic, where the student has to draw up the complete Software Life Cycle plan which includes the following:

1. Problem statement for the selected topic.
2. Introduction to the topic.
3. Software Requirement Specification(User Requirements, System Requirements, Functional and Non-Functional Requirements and Domain Requirements)
4. Design Models (Context models, Behavioural models, Data models, Object models, Structured methods.
5. Detail Description of the models designed to be explained.
6. Architectural Design (Architectural style appropriate to the topic should be designed)
7. Project estimation and Project Schedule should be drawn up by the student.
8. Test cases should be written for the project topic showing the various tests that will be executed once the project completes.

Evaluation Rubrics For AAT (5 Marks)

Criteria	Excellent	Good	Average	Poor
Ability to write the problem statement and specify the complete requirements. (1)	Able to write the problem statement and write the complete requirements for the given topic. (1)	Ability to write the problem statement and write most of the requirements for the given topic. (0.75)	Ability to write the problem statement and write some requirements for the given topic. (0.5)	Unable to write the problem statement and write the requirements . (0.25)
Ability to design all the different models and select the appropriate architectural style for the given topic. (1)	Able to design all the different models and select the appropriate architectural style for the given topic. (1)	Able to design most of the models and select the appropriate architectural style for the given topic. (0.75)	Able to design specific model and architectural style for the given topic. (0.5)	unable to design any model and architectural style for the given topic.(0.25)
Ability to perform Project estimation and develop the Project Schedule. (1)	Able to perform Project estimation and develop the Project Schedule accurately. (1)	Able to perform Project estimation and develop the Project Schedule with minor errors. (0.75)	Unclear about Project estimation and Project Schedule. (0.5)	Unable to write Project estimation and Project Schedule. (0.25)
Ability to design the test cases for testing the project. (1)	Able to identify and design all the test cases. (1)	Able to identify and design specific test cases. (0.75)	Able to identify and design only few test cases. (0.5)	Unable to write test cases. (0.25)
Report Writing(1)	Clear and Effective writing adhering to appropriate style guidelines. (1)	Clear and effective Writing for the most part and minor violation in adhering to style guidelines. (0.75)	Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines. (0.5)	Unable to complete and submit the report on time. (0.25)

H   SEE Exam Question paper format

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Internal Choice	Two Questions to be asked for 20Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	5th
Course Title:	Software Project Management and Finance			
Course Code:	20CS5HSSPM			
L-T-P:	2-0-0		Total Credits:	2

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Projects:** The Project Management Institute, What is a Project? Project management, Project Manager, Benefits of Project Management. **The Project Environment:** Internal and External Environment, Programs, Mission, Goals, Objectives and Strategy, Portfolios Management, Scoring Matrix, Financial Evaluation Criteria.	6	**Text Book 1** **Chapter 1: 1.1, 1.2, 1.3, 1.4, 1.5** **Chapter 2: 2.1, 2.2, 2.4, 2.5, 2.6, 2.7, 2.8**
2	**Software project planning:** understand project needs, create and diagnose project plan.	4	**Text Book 2** **Chapter 2: 16-32**
3	**Integration:** The Charter, Project Management Plan. **Scope:** Beginning the Scope, Scope Contents, Triple Constraints, Priority Matrix, Scope Issues Sample Scope Statement.	5	**Text Book 1** **Chapter 6: 6.1, 6.2** **Chapter 7: 7.1, 7.2, 7.4, 7.5, 7.6**
4	**Cost Estimation:** Cost Politics, Cost Estimation, Types of Cost estimates, Cost estimate examples, Parametric Estimates, The Budget, PERT, Overhead Costs.	5	**Text Book 1** **Chapter 11:11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8**
5	**Quality:** Key Concepts, Quality Planning, Quality Assurance, Quality Control. **Risks:** Risks, Risks Strategies, Planning Risk Management, Identify Risks, Risk Assessment, Risk Monitoring and Control.	6	**Text Book 1** **Chapter 14: 14.1, 14.2, 14.3, 14.4** **Chapter 17: 17.1, 17.2, 17.3, 17.4, 17.5, 17.6**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	The Art and Science of Project Management	Roger Warburton and Vijay Kanabar	Second Edition	RW Press Newport	2013
2.	Applied Software Project Management	Andrew Stellman and Jennifer Green	First Edition	Oriely publications	2012

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Project Management for Business, Engineering and Technology	Nicholas, J. and Steyn	5th	ELSEVIER.	2017
2.	Project Planning, Analysis, Selection, Implementation and Review	Prasanna Chandra	9th	New Delhi, Tata McGraw Hill Publications	2019

E-Book						
Sl No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	Software Project Management	Bob Hughes, Mike Cotterell	4th Edition	Tata McGraw Hill Publications	2006	http://ebooks.lpude.in/management/mba/term_4/DCAP304_DCAP515_SOFTWARE_PROJECT_MANAGEMENT.pdf
2.	Information Technology Project Management	Kathy Schwalbe	8th Edition	Thompson	2015	https://files.transtutors.com/cdn/uploadassignments/2411827_1_information-technology-project-management--8-edition-.pdf

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Business Planning & Project Management	Swayam NPTEL	2020	https://swayam.gov.in/nd2_cec20_mg07/preview
2.	Fundamentals of Project Planning and Management	Coursera	2019	https://www.coursera.org/learn/uva-darden-project-management

B   Course Outcomes
At the end of the course the student will be able to

CO1	Ability to identify and apply Software Project management concepts for software development.
CO2	Ability to analyze and estimate the Scope, cost and outline the project plan.
CO3	Ability to develop project planning using Gantt chart and identify issues with project life cycle.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3										3		3		
CO2		3									3		3		
CO3			3		3						3		3		

D Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	One	5
Lab Component	---	---
Self-Study Component	----	---
AAT	One	5
Total		**50**

E Tutorial Plan *(if applicable)*

F Laboratory Plan *(if applicable)*

G Alternate Assessment Tool Plan *(if applicable)*

Students need to form a group of 2 to 4 members and select one project which can be a project from the previous semesters (for example: IoT, MAD project) follow the video given below and need to prepare all the necessary documents for the project that they have chosen and prepare the report according to the format to be given by the faculty. Software can be downloaded or will be provided by the faculty

Criteria	Exemplary	Proficient	Partially Proficient	Points
Analyze the given problem and implementation of appropriate results using project management tool (3)	Completely Analyze the given problem and implementation of appropriate results using project management tool (3)	Moderately Analyze the given problem and implementation of appropriate results using project management tool (2)	Analyze the given problem and Moderately implement appropriate results using project management tool (1)	_ / 3
Report(1)	Clear and Effective writing and adherence to appropriate style guidelines (1)	Writing that is clear and effective for the most part and minor errors inadherence to appropriate style guidelines (0.5)	Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines (0.5)	_ / 1
Oral communication (presentation) (1)	Clear and effective communication (1)	Communication is clear (0.5)	Unclear communication (0)	_ / 1

https://www.youtube.com/watch?v=_eD2u8bxecs&pbjreload=10

H SEE Exam Question paper format

Unit-1	Internal Choice	Two Questions to be asked for 20Marks
Unit-2	Mandatory	One Question to be asked for 20Marks each
Unit-3	Mandatory	One Question to be asked for 20Marks
Unit-4	Internal Choice	Two Questions to be asked for 20Marks
Unit-5	Mandatory	One Question to be asked for 20Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	15%
Apply / Analyze	35%
Create / Evaluate	50%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	5th
Course Title:	Internet of Things			
Course Code:	20CS5PEIOT			
L-T-P:	2-0-1		Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies, IoT Levels and Templates	5	**Text Book 1:** **Chapter - 1** **(1.1.1, 1.2.2, 1.3.2, 1.3.3, 1.4, 1.5)**
2	Sensors and Actuators – Introduction and example, Introduction to Arduino, Arduino IDE, Digital Analog Input and Output, Arduino Library and Functions, Sensor interfacing with Arduino, Sensor and actuator interfacing with Arduino	6	**Text Book 2:** **Chapter - 1** **Chapter - 4 (4.1-4.3)** **Chapter - 5 (5.1-5.7)** **Chapter - 7 (7.1, 7.2, 7.4)** **Chapter - 8 (8.1)** **Chapter - 11 (11.1)** **Chapter - 12 (12.1, 12.2),** **Text Book 3: (Chapter 3)**
3	Connecting microcontroller with mobile devices, communication through Bluetooth, Wi-Fi, Ethernet, RFID Architecture Reference Model- Introduction, architecture , Protocols- 6LoWPAN, RPL, CoAP, MQTT	5	**Text Book 3:** **Chapter -17** **17.1, 17.2, 17.3, 17.4, 17.5, 17.6** **Text Book 2 :** **Chapter - 6 (6.9)** **Chapter - 15 (15.1, 15.2)** **CISCO IOT architecture** **http://cdn.iotwf.com/resources/71/IoT_Reference_Model_White_Paper_June_4_2014.pdf** **6LoWPAN - Text Book 4:** **16.1 - 17.6.2.2** **RPL - Text Book 4:** **17.1 - 17.6.4.1** **CoAP :** **https://www.cse.wustl.edu/~jain/cse574-14/ftp/coap/** **MQTT - https://www.hivemq.com/**
4	Intel IOTivitiy – Device discovery functionality Introduction to Cloud Storage, Cloud Storage models and communication APIs for IoT, WAMP-AutoBahn for IoT	5	**Reference link** **Intel IOTivity(iotivity.org)** **Text Book 1: Chapter - 8 (8.1, 8.2)**

5	Example Amazon Web services for IOT EC2, AutoScaling, S3, RDS,SQS	5	**Text Book 1:** **Chapter – 8: (8.6 - 8.6.1, 8.6.2, 8.6.3, 8.6.4, 8.6.7, 8.6.8)**

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Internet of Things: A Hands-On Approach	ArsheepBahga, Vijay Madisetti	1st	Orient Blackswan Private Limited	2015
2.	Arduino Cookbook	Michael Margolis	2nd	O'Reilly Media	2011
3.	Arduino Applied: Comprehensive Projects for Everyday Electronics	Neil Cameron	1st	Apress	2019

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Beginning Arduino Programming	Brian Evans	1st	Apress	2011

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Designing for the Internet of Things	---	2	Oreill	2017	https://www.oreilly.com/design/free/designing-for-the-internet-of-things.csp
2.	Using the Web to Build the IoT	DOMINIQUE GUINARD	2	Manning Publisher	2016	https://webofthings.org/2016/04/24/free-book-using-the-web-to-build-the-iot/

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Introduction to Internet of Things	IIT Kharagpur	2018	https://nptel.ac.in/courses/106/105/106105166/
2.	AWS IoT: Developing and Deploying an Internet of Things	Edx	2020	https://www.edx.org/course/aws-iot-developing-and-deploying-an-internet-of-th

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** various protocols, device discovery and cloud services in resource constraint network for IoT applications.
CO2	Ability to **analyse** the various IoT architectural components.
CO3	Ability to **develop** IOT systems using with Arduino development board by interfacing sensors, communication modules and actuators.
CO4	Ability to **conduct** experiments to **demonstrate** the working of sensors, actuators, communication modules using Arduino IDE.
CO5	Ability to **apply** domain knowledge of IoT and identify the Topics /concepts to demonstrate effective oral and written communication skills.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3														
CO2		3													3
CO3			3												
CO4				3											
CO5	3	3			2			3	3	3	2				

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**Two**	**20**
Lab Component	Two Lab Tests + Continuous evaluation	**25**
AAT	**Seminar**	**05**
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Internet of Things Lab - Plan of Activities

Evaluation: 25 Marks

Instructions to Students to be followed in each IOT lab:

1. Each Student should write down the work carried out and the outputs in the observation book and get it evaluated by the respective lab faculty in-charge.

2. Each Student should bring the lab record with the programs and output written for the programs completed in their respective previous week and get it evaluated by the lab faculty in-charge. In the record book students should
    - Handwrite the Circuit diagram
    - Handwrite the Program

3. Each Student should practice programs using different sensor and actuator combinations also.

Note:

a. Lab test will consists of new set of programs, but designed using the sensor and actuators practiced in the lab.

b. In the beginning of the semester, all three course teachers need to discuss and design the open ended questions that can be given to students. The four open ended questions will be framed based on different sensors, actuators, communication modules which are not part of lab programs. Each of the above will be evaluated for 10 marks in the lab and will be included as part of the continuous evaluation process

Experiment #	Unit #	Name of Experiment	Remarks
1	II	LED Fading both analog and digital	
2	II	Traffic Controller	
3	II	Night light simulation	
4	II	Motion detection Sensor (PIR)	
5	II	Home Automation using Bluetooth	
6	II	Fire extinguisher system	
7	II	Automatic irrigation controller simulation	
8	II	Reverse parking sensor (Using LCD Display)	
9	II	Color recognition system	
10	III	RFID reader and RFID tag count Debugging	
11	III	Bluetooth Master/Slave	
12	III	Fire alert system using GSM	
13	III	Weather monitoring system using Wifi	

G   Alternate Assessment Tool Plan *(if applicable)*
Seminar on current trends in IoT need to be presented, choosing any application on their own by the students.

Criteria	Exemplary	Proficient	Partially Proficient	Points
Able to completely analyse and apply domain knowledge of IoT in any topic given and effectively make oral and written communication. (3)	Completely Analyse and apply domain knowledge of IoT in any topic given and effectively make oral and written communication. (3)	Moderately analyse and apply domain knowledge of IoT in any topic given and effectively make oral and written communication. (2)	Analyse and apply domain knowledge of IoT in any topic given and effectively make oral and written communication. (1)	_ / 3
Report(2)	Clear and Effective writing and adherence to appropriate style guidelines (2)	Writing that is clear and effective for the most part and minor errors inadherence to appropriate style guidelines (1)	Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines (0.5)	_ / 1
Oral communication (presentation) (1)	Clear and effective communication (1)	Communication is clear (0.5)	Unclear communication (0)	_ / 1

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	15%
Apply / Analyze	35%
Create / Evaluate	50%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem.	5th
Course Title:	Advanced Java and J2EE		
Course Code:	20CS5PEAJJ		
L-T-P:	2-0-1	Total Credits:	3

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**String Handling :**The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer	5	**Text Book 1 Chapter 16**
2	**The collections Framework:** Collections Overview, JDK 5 Changed the Collections Framework, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Spilaterators, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Arrays, The legacy Classes and Interfaces, Parting Thoughts on Collections.	5	**Text Book 1 Chapter 18**
3	**Swings:** Swings, The origins of Swing, Swing is built on the AWT, Two key Swing features, The MVC Connection, Components and Containers, The Swing Packages, A simple Swing Application, Event Handling, Create a Swing Applet, Jlabel and ImageIcon, JTextField, The Swing Buttons, JScrollPane, JList; JComboBox, JTable.	5	**Text Book 1 Chapter 31, 32**
4	**JDBC** The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Metadata, Data types, Exceptions.	5	**Text Book 2 Chapter 6**
5	**Servlets:** Background, The Life Cycle of a Servlet, Using Tomcat for Servlet Development, A simple Servlet, The Servlet API. The Javax.servlet Package, Reading Servlet Parameter **JSP:** Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects.	6	**Text Book 2 Chapter 10, 11**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Java the Complete Reference	Herbert Schildt	9th	Tata McGraw-hill	2014
2.	J2EE - The Complete Reference	Jim Keogh	----	Tata McGraw Hill	2017

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to JAVA Programming	Y. Daniel Liang	6th	Pearson education	2007
2.	The J2EE Tutorial	Stephanie Bodoff	2nd	Pearson Education	2004

E-Book						
Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Advanced Java programming	Uttam Kumar Roy	----	Oxford University Press	2015	http://93.174.95.29/main/1F97EBCDD44EE9847B8FCAFCBC702F18
2.	The Java EE 6 Tutorial: Advanced Topics	Eric Jendrock, Ricardo Cervera-Navarro, Ian Evans, Devika Gollapudi, Kim Haase, William Markito, ChinmayeeSrivathsa	4th	Addison-Wesley Professional	2013	http://93.174.95.29/main/FF75B28E3930BA26B669B6338CD7DF17
3	Advanced Java 2 Platform How to Program	H. M. Deitel, P. J. Deitel, S. E. Santry	----	Prentice-Hall	2001	http://gen.lib.rus.ec/book/index.php?md5=093C2E679ED2E915A55F1D31BD832D74
4	Core Java Volume II - Advanced Features.	Cay Horstmann	11th	Prentice Hall	2019	http://gen.lib.rus.ec/book/index.php?md5=3CC3BEE79BB106A134B5A99F67992AF2

MOOC Course			
Sl. No.	Course name	Course Offered By	Year	URL
1.	Fundamentals of Java EE Development	edx	2020	https://www.edx.org/course/fundamentals-of-java-ee-development
2.	Advanced JAVA	Prof. Naveen	2020	https://freevideolectures.com/course/3690/advanced-java

B   Course Outcomes

At the end of the course the student will be able to

CO1	Able to apply strings, collections and Swings in developing modular and efficient programs
CO2	Able to analyze Java applications comprising of strings, collections, Swings, JDBC, servlet and JSP.
CO3	Able to develop Java applications to use database connection using JDBC Package, servlet and JSP application
CO4	Able to develop programs that demonstrate the advanced Java and J2EE concepts

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		3													
CO3			3												2
CO4	3	2	3		3										2

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**20**
QUIZ	**ONE**	**5**
Lab Component	**Two Lab Tests + Continuous Evaluation**	**25**
Alternate Assessment Tool	--	--
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Instructions:

1. Each Student should write down the work carried out and the outputs in the observation book and get it evaluated by the respective lab faculty in-charge.

2. Each Student should bring the lab record with the programs and output written for the programs completed in their respective previous week and get it evaluated by the lab faculty in-charge.

Note:

a. Lab test will consist of a new set of programs as designed by the instructor, following concepts to be practiced in the lab.

b. In the beginning of the semester, all section course teachers can discuss and design the open ended questions that can be given to students. The four open ended questions will be framed based on each of the four topics - Collections, Swings, JDBC AND JSP. Each of the above will be evaluated for 10 marks in the lab and will be included as part of the continuous evaluation process.

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Lab Program	Unit #	Program Details
1	**1**	a. Write a Java program to concatenate two strings. b. Write a Java program to check if a string is a palindrome or not.
2	**1**	a. Write a Java program to extract a portion of a character string and print the extracted string. Assume that m characters are extracted, string starting with the nth character. b. Write a program that displays information on the current date.
3	**1**	a. Write a Java program that reads a statement from user input and prints how many words it has. b. Write a Java program that reads a collection of words and prints words in alphabetical order.
4	**2**	Write a Java program to illustrate collection classes like (i) Array List (ii) Iterator (iii) Hash set.
5	**2**	a. Write a Java program to demonstrate map collection framework b. Write a Java program to check which words in a file are not present in a dictionary using set collection framework
6	**3**	a. Write a Java program to build a Calculator in Swings. b. Write a Java program to display the digital watch in Swings.
7	**3**	a. Write a Java program to create a single ball bouncing inside a JPanel. b. Write a Java program JTree as displaying a real tree upside down.
8	**4**	Build a Library application to accept book information viz. accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings. Also support the deletion and updation of a particular book.
9	**4**	a. Demonstrate a simple Java servlet Showing Different Styles of a Phrase. b. Demonstrate a simple Java servlet to Display Multiplication Table in Servlet for a Number Entered in Html Page.
10	**4**	Write a Java Servlet Program to read contents from one file and write the same into another file and also display the read contents on the browser.
11	**5**	Write a Java JSP Program which uses tag to run an applet.
12	**5**	a. Demonstrate simple JSP program showing increased font size. b. Write a JSP program to construct a Fibonacci series from the number entered by the user on screen.

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	30%
Apply / Analyze	40%
Create / Evaluate	30%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020 / Jan-May 2021	Sem.	5th
Course Title:	Advanced Data Structures		
Course Code:	20CS5PEADS		
L-T-P:	2-0-1	Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Disjoint Sets** Basic Data Structure, Smart Union algorithms, Path Compression, Time complexity for Union-by-Rank and Path compression, Applications. **Advanced Lists** Generic Linked List, Memory efficient doubly linked list, XOR Linked List, Skip List, Self Organizing List, Unrolled Linked List.	5	**Text Book 2 Chapter 8: 8.3, 8.4, 8.5, 8.6, 8.7** https://www.geeksforgeeks.org/advanced-data-structures/
2	**Trees** AVL Trees-Construction, Insertion, Rotation, Deletion operations, Splay Trees, 2-3 Trees-Construction, Insertion and Deletion operations, B-Trees- Construction, Insertion and Deletion operations, Red-Black Trees- Construction, Insertion and Deletion operations. Applications of Red-Black Trees.	6	**Text Book 2 Chapter 4: 4.4, 4.5, 4.7 Chapter 13: 13.1, 13.2, 13.3, 13.4**
3	**Trees and Advanced Lists** Trie, Suffix Array Tree, Segment Tree, Splay Goat Tree, K-Dimensional Tree, Binary Indexed Tree or Fenwick Tree.	5	https://www.geeksforgeeks.org/advanced-data-structures/
4	**Hashing** Collision Resolution Techniques: Hash Tables without Linked Lists, Quadratic probing, Double hashing, Rehashing, Extendible Hashing. Applications of Hashing.	4	**Text Book 2 Chapter 5: 5.4-5.4.2, 5.4.3, 5.5, 5.7**
5	**Heaps** Binomial trees and Binomial heaps. Operations on binomial heaps. Structure of Fibonacci Heaps, Mergeable heap operations, Decreasing a key and deleting a node.	6	**Text Book 1 Chapter 19: 19.1, 19.2 Chapter 20: 20.1, 20.2, 20.3**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Introduction to Algorithms	T. H Cormen, C. E. Leiserson and R. L. Rivest	2nd Edition	Prentice Hall India	2001
2	Data Structures and algorithm analysis in C++	Marks Allen Wesis	3rd Edition	Pearson Education	2014

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Computer Algorithms	Ellis Horowitz, SatrajSahni and Rajasekharam	2nd Edition	University Press Pvt. Ltd,	2009

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Data structures and Algorithm Analysis in C++"	Allen Weiss	Fourth edition	Pearson education	2014	http://iips.icci.edu.iq/images/exam/DataStructuresAndAlgorithmAnalysisInCpp_2014.pdf
2.	Introduction to Algorithms	T. H Cormen, C. E. Leiserson and R. L. Rivest	2nd Edition	Prentice Hall India	2001	https://docs.google.com/file/d/0B8E8cIkryecoT0xWYzl4ZjhwV2c/edit

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Advanced Data Structures in Java	Coursera	2019	https://www.coursera.org/learn/advanced-data-structures
2.	Data Structures and Algorithms	NPTEL	2009	https://nptel.ac.in/courses/106/102/106102064/
3.	Programming and Data Structures	NPTEL	2009	https://nptel.ac.in/courses/106105085/

B Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **analyze** the usage of appropriate data structure for a given application.
CO2	Ability to **design** an efficient algorithm for performing operations on various advanced data structures.
CO3	Ability to **apply** the knowledge of hashing techniques.
CO4	Ability to **conduct** practical experiments to solve problems using an appropriate data structure.

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1													
CO2			3												3
CO3	2														
CO4				3											

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	20
QUIZ/ AAT	One	05
Lab Component	2 Lab Tests + Continuous Evaluation	25
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*
Note: The faculty handling the course (of all sections) should discuss and prepare four open-ended question (applications based on the topics covered in the theory class for each unit).

The continuous evaluation for the lab is done as follows:
- 10 marks for each lab program and 10 marks for open-ended questions.
- Final continuous evaluation marks will be calculated for 10 marks: (10 marks lab programs + 10 marks open-ended)/2

Lab Test-1: 15 marks for test-1 + 10 marks: Average of first 5 lab programs + 2 application implementation of the open ended question set
Lab Test-2: 15 marks for test-2 + 10 marks:
Average of last 5 programs + 2 application implementation of the open ended question set.

Sl. No	Program	Unit
1	Write a program to implement the following list: An ordinary Doubly Linked List requires space for two address fields to store the addresses of previous and next nodes. A memory efficient version of Doubly Linked List can be created using only one space for address field with every node. This memory efficient Doubly Linked List is called XOR Linked List or Memory Efficient as the list uses bitwise XOR operation to save space for one address. In the XOR linked list, instead of storing actual memory addresses, every node stores the XOR of addresses of previous and next nodes.	**UNIT 1**
2	Write a program to perform insertion, deletion and searching operations on a skip list.	**UNIT 1**
3	Given a boolean 2D matrix, find the number of islands. A group of connected 1s forms an island. For example, the below matrix contains 5 islands {1, 1, 0, 0, 0}, {0, 1, 0, 0, 1}, {1, 0, 0, 1, 1}, {0, 0, 0, 0, 0}, {1, 0, 1, 0, 1} A cell in the 2D matrix can be connected to 8 neighbours. Use disjoint sets to implement the above scenario.	**UNIT 1**
4	Write a program to perform insertion and deletion operations on AVL trees.	**UNIT 2**
5	Write a program to perform insertion and deletion operations on 2-3 trees.	**UNIT 2**
6	Write a program to implement insertion operation on a red black tree. During insertion, appropriately show how recolouring or rotation operation is used.	**UNIT 2**
7	Write a program to implement insertion operation on a B-tree.	**UNIT 2**

8	Write a program to implement functions of Dictionary using Hashing.	UNIT 3
9	Write a program to implement the following functions on a Binomial heap: 1. **insert(H, k):** Inserts a key 'k' to Binomial Heap 'H'. This operation first creates a Binomial Heap with single key 'k', then calls union on H and the new Binomial heap. 2. **getMin(H):** A simple way to getMin() is to traverse the list of root of Binomial Trees and return the minimum key. 3. **extractMin(H):** This operation also uses union(). We first call getMin() to find the minimum key Binomial Tree, then we remove the node and create a new Binomial Heap by connecting all subtrees of the removed minimum node. Finally we call union() on H and the newly created Binomial Heap.	UNIT 5
10	Write a program to implement the following functions on a Binomial heap: 1. **delete(H):** Like Binary Heap, delete operation first reduces the key to minus infinite, then calls extractMin(). 2. **decreaseKey(H):** decreaseKey() is also similar to Binary Heap. We compare the decreases key with it parent and if parent's key is more, we swap keys and recur for parent. We stop when we either reach a node whose parent has smaller key or we hit the root node.	UNIT 5

G   **Alternate Assessment Tool Plan** *(if applicable)*
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H   **SEE Exam Question paper format**

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem.	5th
Course Title:	Advanced Algorithms		
Course Code:	20CS5PEAAG		
L-T-P:	3-0-0	Total Credits:	3

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Dynamic Programming:** Rod cutting, Matrix-chain multiplication, Longest common subsequence, Multistage graph, Longest increasing subsequence, Edit Distance, Egg Dropping Puzzle	7	TextBook1: Chapter 15: 15.1, 15.2, 15.4 TextBook3: Chapter 5.2 https://www.geeksforgeeks.org/
2	**Maximum Flow:** Flow networks, The Ford-Fulkerson method, Maximum bipartite matching Multithreaded Algorithms: The basics of dynamic multithreading, Multithreaded matrix multiplication, Multithreaded merge sort	9	Text Book1: Chapter 26: 26.1, 26.2, 26.3 Chapter 27: 27.1, 27.2, 27.3
3	**String matching:** The naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata. Input Enhancement in String Matching: Horspools and Boyer Moore Algorithm	9	Text Book1: Chapter 32: 32.1, 32.2, 32.3 Text Book2: Chapter 7: 7.2
4	**Linear Programming:** Standard and slack forms, Formulating problems as linear programs, The simplex algorithm	7	Text Book1: Chapter 29: 29.1, 29.2, 29.3
5	**Computational Geometry:** Line-segment properties, Determining whether any pair of segments intersects, Finding the convex hull, Finding the closest pair of points	7	Text Book1: Chapter 33: 33.1, 33.2, 33.3, 33.4

Prescribed Text Book				
Sl. No.	Book Title	Authors	Edition	Publisher	Year
---	---	---	---	---	---
1.	Introduction to Algorithms	Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein	Third Edition	The MIT Press	2009
2.	Introduction to the Design and Analysis of Algorithm	Anany Levitin	Third Edition	Pearson	2011
3.	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahni and Rajasekharam	2nd Edition	University Press Pvt. Ltd,	2009

Reference Text Book					
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
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E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	Data structures and Algorithm Analysis in C++	Mark Allen Weiss	Fourth edition	Pearson education	2014	http://www.uoitc.edu.iq/images/documents/informatics-institute/Competitive_exam/DataStructures.pdf

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Advanced Algorithms and Complexity	Coursera	2020	https://www.coursera.org/learn/advanced-algorithms-and-complexity

B   Course Outcomes
At the end of the course the student will be able to

CO1	Ability to understand and **apply** various complex algorithm techniques for various computing situations.
CO2	Ability to **analyse** the given algorithm for its correctness and solve the problems by applying algorithms techniques
CO3	Ability to **design** efficient algorithms for various complex computing case studies.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3			2										2	
CO2		3												2	
CO3			3	3										2	

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	Two	40
QUIZ/AAT	Two	10
Lab Component	----	---
Alternate Assessment Tool	---	---
Total		**50**

E   Tutorial Plan *(if applicable)*

F   **Laboratory Plan** *(if applicable)*

G   **Alternate Assessment Tool Plan** *(if applicable)*

H   **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May-2021	Sem.	5th
Course Title:	System Software and Compiler Design		
Course Code:	20CS5PESCD		
L-T-P:	3-0-0	Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Introduction to System Software, Machine Architecture of SIC and SIC/XE. **Assemblers:** Basic assembler functions.	6	**Text Book-1** **Page No. 1 to 12.** **Page No. 43 to 52.**
2	Machine dependent assembler features, Machine independent assembler features, Assembler design options. Implementation example: MASM.	7	**Text Book-1** **Page No. 52 to 105.**
3	**Loaders:** Basic Loader Functions, Loaders: Machine dependent features, Machine independent features, Loader design options, Implementation example: MS-DOS linker.	8	**Text Book-1** **Page No. 123 to 162.**
4	**Macro processor:** Basic macro processor, Machine independent macro processor features, Macro processor design options, Implementation example: MASM macro processor, ANSI C macro processor	9	**Text Book-1** **Page No. 175 to 213.**
5	**Compilers:** Basic compiler functions, Machine dependent compiler features, Machine independent compiler features, Compiler design options, Implementation example: SunOS C compiler	9	**Text Book-1** **Page No. 225 to 308.**

Prescribed Text Book				
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	System software	Leland L. Beck	3rd edition	Pearson publication	2001

Reference Text Book				
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	System Programming	Donovon	-	Tata McGraw-Hill Education.	2001

E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	System Software	Dharminder Kumar	--	Excel Books Private Limited, Lovely Professional University Phagwara	Copyright © 2012	http://ebooks.lpude.in/computer_application/mca/term_4/DCAP507_SYSTEM_SOFTWARE.pdf

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MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	System Programming	NPTEL	2013-14	https://sites.google.com/a/venusict.org/system-programming/nptel-vide
2.	Compiler Design	NPTEL	2018	https://nptel.ac.in/courses/106105190/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to Apply knowledge of various System software's like Assembler, Compiler, Loader, Macro, Linker to demonstrate their working concepts
CO2	Ability to analyse features and functionalities of Assembler, Compiler, Loader, Macro and Linker
CO3	Ability to design some features of system softwares

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3											3		
CO2			3												
CO3				2											2

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**40**
QUIZ	**TWO**	**10**
Lab Component	--	--
Alternate Assessment Tool	--	--
Total		**50**

E   Tutorial Plan *(if applicable)*
--

F   Laboratory Plan *(if applicable)*
--

G   Alternate Assessment Tool Plan *(if applicable)*
--

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May-2021	Sem	5th
Course Title:	Advanced Computer Architecture		
Course Code:	20CS5PEACA		
L-T-P:	3-0-0	Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Fundamentals of Quantitative Design and Analysis:** Introduction; Classes computers; Defining computer architecture; Trends in Technology; Trends in power and energy in Integrated Circuits; Trends in cost; Dependability, Measuring, reporting and summarizing Performance; Quantitative Principles of computer design; Performance and Price-Performance; Fallacies and pitfalls; Case studies.	7	Book-1: Chapter-1
2	**Instruction-Level Parallelism:** Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazards with Dynamic Scheduling, **Dynamic Scheduling:** Examples and the Algorithm, Hardware-Based Speculation, Exploiting ILP Using Multiple Issue and Static Scheduling, Exploiting ILP Using Dynamic Scheduling, Multiple Issue, and Speculation, Advanced Techniques for Instruction Delivery and Speculation, Studies of the Limitations of ILP.	8	Book-1: Chapter-3:3.1 to 3.10
3	**Cross-Cutting Issues:** ILP Approaches and the Memory System, Multithreading: Exploiting Thread-Level Parallelism to Improve Uniprocessor Throughput Memory Hierarchy Design, Introduction, Ten Advanced Optimizations of Cache Performance, Memory Technology and Optimizations, Protection: Virtual Memory and Virtual Machines, Crosscutting Issues: The Design of Memory Hierarchies	8	Book-1: Chapter-3: 3.11 to 3.12 Chapter-2: 2.1 to 2.5
4	**Data-Level Parallelism in Vector, SIMD, and GPU Architectures:** Introduction, Vector Architecture, SIMD Instruction Set Extensions for Multimedia, Graphics Processing Units, Detecting and Enhancing Loop-Level Parallelism, Crosscutting Issues	8	Book-1: Chapter-4: 4.1 to 4.6
5	**Thread-Level Parallelism:** Introduction, Centralized Shared-Memory Architectures, Performance of Symmetric Shared-Memory Multiprocessors, Distributed Shared-Memory and Directory-Based Coherence, Synchronization: The Basics, Models of Memory Consistency: An Introduction, Crosscutting Issues	8	Book-1: Chapter-5: 5.1 to 5.7

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Computer Architecture -A quantitative approach	John L. Hennessy and David A Patterson	5th Edition	Elsevier	2012

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
2.	Advanced Computer Architecture -Parallelism, Scalability, Programmability	Kai Hwang	2nd Edition	Tata McGraw Hill,	2010

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	--	---	--	--	--	---

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Advanced Computer Architecture	Indian Institute of Technology Guwahati	2019	NPTEL via Swayam

B Course Outcomes

At the end of the course the student will be able to

CO1	Able to describe Technological Trends in Computer Architecture.
CO2	Able to Analyze Instruction Level Parallelism.
CO3	Able to Analyze Thread Level Parallelism.
CO4	Able to Analyze Data Level Parallelism.

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2												1		
CO2		3											1		
CO3		3											1		
CO4		3											1		

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	TWO	10
Lab Component	--	--
Alternate Assessment Tool	--	--
Total		50

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	One Question to be asked for 20 Marks
Unit-5	Mandatory	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem	5th
Course Title:	Project Work-3			
Course Code:	20CS5PWPW3			
L-T-P:	0-0-2		Total Credits:	2

A   Syllabus

Introduction:

- Under this project work, student should develop Advanced Web based Application using technologies such as Node JS, React or Mobile App Development using Android or any similar Advanced web technologies or Mobile Application technologies.

- It can be extension of 4th sem project with back end connection but it should be a Mobile App or Front end with advanced web technologies.

- Students can form a group with minimum of two and maximum of four.

- Teacher allotted for project work to students should teach students technologies like Node JS, React, Android etc., during Class/Lab hours as per the allotment.

- Teacher allotted for project work should guide the student
- s in choosing the topic and towards carrying out project work and complete the evaluation of assigned students.

- The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to apply the practical knowledge and latest tools for the project development.
CO2	Ability to design and develop a project using Advanced Web or Mobile technologies to solve societal problems.
CO3	Ability to report and present the implemented solutions in a team

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3										
CO2	3	3	3	2	3	2	2	2				1	1	3	2
CO3								2	3	3					

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D **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internals	--	--
QUIZ	--	---
Lab Component	--	50
Alternate Assessment Tool	--	--
Total		50

Rubrics for Project Evaluation:

Criteria	Exemplary	Proficient	Partially Proficient	Points
Layout	(10) The Web site /Mobile App has an exceptional design, attractive and usable layout. It is easy to locate all important elements.	(6) The Web pages / Mobile app have an attractive design and usable layout. It is easy to locate all important elements.	(4) The Web pages/ Mobile App have a usable design layout, but may appear busy or boring. It is easy to locate most of the important elements.	___ / 10
Navigation	(5) Links for navigation are clearly labelled, consistently placed, allow the reader to easily move from a page to related pages (forward and back), and take the reader where s/he expects to go. A user does not become lost.	(3) Links for navigation are clearly labelled, allow the reader to easily move from a page to related pages (forward and back), and internal links take the reader where s/he expects to go. A user rarely becomes lost.	(2) Links for navigation take the reader where s/he expects to go, but some needed links seem to be missing. A user sometimes gets lost.	___ / 5
Validation of Form fields	(10) Validations have been carried out for all form fields completely in all the webpages.	(6) Most of the validations have been carried out for all form fields completely in all the webpages.	(4) Few of the validations has been carried out for the form fields in the webpages.	___ /10

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Background	(5) Background is exceptionally attractive, consistent across pages, adds to the theme or purpose of the site, and does not detract from readability.	(3) Background is attractive, consistent across pages, adds to the theme or purpose of the site, and does not detract from readability.	(2) Background is consistent across pages and does not detract from readability.	___ /5
Content Accuracy	(5) All information provided by the student on the Web site/Mobile App is accurate, Legal and all the requirements of the assignment have been met.	(3) Almost all the information provided by the student on the Web site/Mobile App is accurate, legal and most of the requirements of the assignment have been met.	(2) Almost all of the information provided by the student on the Web site/Mobile App is accurate, legal and few of the requirements of the assignment have been met.	___ / 5
Report	(5) Clear and Effective writing and adherence to appropriate style guidelines	(3) Writing that is clear and effective for the most part and minor errors in adherence to appropriate style guidelines	(2) Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines	___/5
Oral communication / Presentation	(5) Clear and effective communication	(3) Communication is clear	(2) Unclear communication	___/5
Participation in Discussions	(5) Provided many good ideas; inspired others; clearly communicated ideas, needs, and feelings.	(3) Participated in discussions; on some occasions, made suggestions.	(2) Listened mainly; Rarely spoke up, and ideas were off the mark.	___/5
			Total	__/ **50**

E   **Tutorial Plan** *(if applicable)*

F   Laboratory Plan *(if applicable)*
Project Topics for Website/Mobile App Development:

Department Lab Stock Book Maintenance System; Department Faculty Weekly Report Submission System; Department Faculty Self-Assessment Report Submission System; Department Faculty Self –Appraisal form Submission System; Department Student Project Submission System; Department Conference Paper Submission System; College TEQIP student project proposal submission system;

College TEQIP Faculty Workshop/Conference/Seminar Application Submission System; College Exam Application Form Submission System

Note: Apart from the above mentioned project topics if student groups come up with any innovative project ideas which are useful for the Department / College academic purpose will be considered based on the approval and acceptance from class teacher.

Sl. No	Week	Activity	Content deliverables by the assigned teacher
1	1st	Formation of groups. Note: Student groups of size 2 or 3 or 4	Introduction to node.js
2	2nd	Project topic selection by each group	Create basic web applications with Node.js and back-end database connection
3	3rd	Presentation: Student and Project topic introduction by each group	Introduction to react.js and back-end database connection
4	4th 5th and 6th	Front-end Design Layout of the Forms	Introduction to Android Framework.
5	7th	Presentation on Front-end Design by each group	Simple Mobile application creation for Android and back-end database connection
6	8th and 9th	Back end design of the project tables Design and Development of connecting among different web pages/Mobile App	Development and deployment of Android application.
7	10th	Presentation of tables with front-end and back-end connectivity.	
8	11th	Complete Project Work Demonstration by each group	
9	12th	Project Report Preparation	

G   SEE Exam (50 Marks)
Evaluation of Projects carried out by students by External examiner along with internal faculty.

Academic Year	**Aug-Dec 2020/Jan-May 2021**		**Sem.**	**5th**
Course Title:	**Making Videos with Social message**			
Course Code:	**20CS5NCNC5**			
L-T-P:	**0-0-0**		**Total Credits:**	**ZERO PASS/FAIL**

A Introduction

- Student should make videos with relevant social message or on societal problems with positive impact which will bring change in the society for making better living for both animals and human beings by preserving nature earth.

- Few examples for creating videos on social messages are Saving animals, Child labor, saving trees, Saving water, Recycling, Sustainability etc.,

- The video created by student should be at least five minutes. This video has to be uploaded by respective student on YouTube. Rules and Regulations of Youtube should be followed by the student to upload video.

- Student should produce YouTube link with screen shot of the video for clearing this mandatory course

- Plagiarism check of the video link submitted by student will be taken care so students do not copy someone's video.

B Course Outcomes

CO1	Promoting comprehensive responsibility of engineers to society.
CO2	Demonstrates individual responsibility towards environment and sustainability in practice.

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3									
CO2							3								

D Assessment Plan

CATEGORY	MARKS (RANGE)	Society Awareness Views
L1	90 (90-100)	Video created has more impact on giving the relevant message for the theme selected. The narration and pictures shown in the video is very clear.
L2	80 (80-89)	Video created has impact on giving the relevant message for the theme selected. The narration and pictures shown in the video is clear.
L3	70 (70-79)	Video created has impact on giving the relevant message for the theme selected but not conveying the properly the message. The narration and pictures shown in the video is somewhat correlated.
L4	60 (60-69)	Video created shows partial message for the theme selected. The narration and pictures shown in the video is not getting correlated.
L5	50 (50-59)	Video created does not show the relevant message for the theme selected. The narration and pictures shown in the video is not getting correlated.
L6	40 (40-49)	Video created has does not show the impact on the society for the theme selected. The narration and pictures shown in the video is not getting correlated.

E SEE Exam
Student should produce YouTube link with screen shot of the video for Passing this mandatory.

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Academic Year	Aug-Dec 2020/Jan-May 2021	Sem.	6th
Course Title:	Machine Learning		
Course Code:	20CS6PCMAL		
L-T-P:	3-0-1	Total Credits:	4

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction:** Well Posed Learning Problems, Designing a Learning system, Perspectives and Issues in Machine Learning **Concept Learning:** Concept Learning as search, Find-S, Version Spaces and Candidate Elimination Algorithm, Inductive bias. **Decision Tree Learning:** Decision Tree Representation, Decision Tree Learning Algorithm, Hypothesis Space Search.	7	**Text Book 1:** **Chapter 1: 1.1, 1.2, 1.3** **Chapter 2: 2.3, 2.4,2.5,2.7** **Chapter 3: 3.3, 3.4,3.5**
2	**Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms.	8	**Text Book 1:** **Chapter 5: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6**
3	**Bayesian Learning:** Bayes Theorem and Concept Learning, Maximum Likelihood, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian Belief Network, EM Algorithm.	8	**Text Book 1:** **Chapter 6: 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.11, 6.12**
4	**Instance Based Learning:** K-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case Based Reasoning, Lazy and Eager learning.	8	**Text Book 1:** **Chapter 8: 8.2, 8.3, 8.4, 8.5, 8.6**
5	**Learning Set Of Rules:** Sequential covering algorithms, Learning Rule Sets, Learning First Order Rules, Learning Sets of First Order Rules, Induction as Inverted Deduction, Inverting Resolution.	8	**Text Book 1:** **Chapter 10: 10.2, 10.3, 10.4, 10.5, 10.6, 10.7**

Prescribed Text Book				
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Machine Learning	M M. Mitchell	Indian Edition	Mc Graw Hill	2013

Reference Text Book				
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Introduction to Machine Learning with Python	Andreas C Muller & Sarah Guido	First	Shroff Publishers	2019
2.	Thoughtful Machine learning	Mathew Kirk	First	Shroff Publishers	2019

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Hands-On Machine Learning With Scikit-learn and Tensorflow	Aureliene Geron	First	Oreilly	2017	https://www.kaggle.com/general/95287
2.	The Elements of Statistical Learning	Trevor Hastie, Robert Tibshirani, Jerome H. Friedman	Second	----	2009	https://web.stanford.edu/~hastie/Papers/ESLII.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Machine Learning	Coursera	----	https://www.coursera.org/learn/machine-learning
2.	Introduction to Machine learning	NPTEL	2016	https://swayam.gov.in/nd1_noc20_cs29/preview

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** the different learning algorithms.
CO2	Ability to **analyze** the learning techniques for given dataset.
CO3	Ability to **design** a model using machine learning to solve a problem.
CO4	Ability to **conduct** practical experiments to solve problems using appropriate machine learning techniques.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		1													
CO3			3												2
CO4				3											3

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	**TWO**	**20**
QUIZ	**ONE**	**5**
Lab Component	**Two Lab Tests + Continuous Evaluation**	**25**
Alternate Assessment Tool	**--**	**--**
Total		**50**

E **Tutorial Plan** *(if applicable)*

F **Laboratory Plan** *(if applicable)*

Instructions:

a) Design, develop and implement the specified algorithms for the following problems using Python Language in LINUX / Windows environment. But preferably on LINUX environment.
b) Data sets can be taken from standard repositories.
c) Lab Record - Handwrite the Algorithm and attach the printout of the Program and the output.

Note: The faculty in charge of Machine Learning course of all the sections must come up with appropriate applications for each of the lab programs. The students are expected to choose suitable datasets and apply the specified algorithm to implement the given application. Depending on the output generated by the student the evaluation for the week must be done.

Lab Program	Unit #	Program Details
1	1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples.
2	1	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3	1	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4	3	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets
5	3	Write a program to construct a Bayesian network considering training data. Use this model to make predictions.
6	3	Apply k-Means algorithm to cluster a set of data stored in a .CSV file.
7	3	Apply EM algorithm to cluster a set of data stored in a .CSV file. Compare the results of k-Means algorithm and EM algorithm.
8	4	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.
9	4	Implement the Linear Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
10	4	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

G **Alternate Assessment Tool Plan** *(if applicable)*

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H   **SEE Exam Question paper format**

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	20%
Apply / Analyze	60%
Create / Evaluate	20%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
DEPARTMENT OF CSE

Academic Year	Aug-Dec-2020/Jan-May 2021		Sem.	6th
Course Title:	Cryptography and Network Security			
Course Code:	20CS6PCCNS			
L-T-P:	3-1-0		Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Introduction to Cryptography and security goals Cryptography and cryptanalysis, Classical Cryptography, different type of attack: CMA, CPA, CCA etc., Shannon perfect secrecy, OTP, Pseudo random bit generators, stream ciphers and RC4. Mathematics of Symmetric Key Cryptography: Groups, Rings, Fields, Extended Euclidean algorithm, Finite Field, $GF(2^n)$ fields.	7	**Text Book 1** **Chapter 1: 1.1, 1.2** **Chapter 3: 3.1, 3.2, 3.3, 3.4** **Chapter 4: 4.1, 4.2**
2	Introduction to modern block ciphers and modern stream ciphers. Block ciphers: Modes of operation, DES and its variants, finite fields (2n), AES, linear and differential cryptanalysis.	8	**Text Book 1** **Chapter 5: 5.1, 5.2** **Chapter 6: 6.1, 6.2, 6.3, 6.4, 6.5** **Chapter 7: 7.1, 7.2, 7.3, 7.4, 7.6**
3	Number Theory: Fermat's theorem, Cauchy 's theorem, Chinese remainder theorem, Primality testing algorithm, Quadratic residues, Legendre symbol, Jacobi symbol.	8	**Text Book 1** **Chapter 2: 2.1** **Chapter 9: 9.1, 9.2, 9.3, 9.4, 9.5**
4	One-way function, trapdoor one-way function, Public key cryptography, RSA cryptosystem, Diffie-Hellman key exchange algorithm, ElGamal Cryptosystem, Elliptic Curve cryptosystems.	8	**Text Book1** **Chapter 10: 10.1, 10.2, 10.3, 10.4, 10.5**
5	Cryptographic hash functions, secure hash algorithm, Message authentication, digital signature, RSA digital signature.	8	**Chapter 12: 12.1** **Chapter 13: 13.1, 13.2, 13.4, 13.5- 13.5.1, 13.5.2**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	"Cryptography and Network Security"	Behrouz A. Forouzan and Debdeep Mukhopadhyay	2nd edition	Tata McGraw Hill	2013
2.	"Cryptography and Network Security Principles and practice"	W. Stallings	5th edition	Pearson Education Asia	2013

Reference Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	"Cryptography: Theory and Practice"	Stinson. D.	3rd edition	Chapman & Hall/CRC	2012
2.	"Cryptography and Network Security"	Atul Kahate		Tata McGraw-Hill	2003

E-Book						
Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Cryptography and Network Security. Principles and Practice	William Stallings	3rd edition	Pearson Education	2007	http://williamstallings.com/Crypto3e.html
2.	Handbook of Applied Cryptography	Menez, van Oorschot, Vanstone	ISBN: 0-8493-8523-7	CRC Press	2001	http://www.cacr.math.uwaterloo.ca/hac/

MOOC Course				
Sl. No.	Course name	Course Offered By	Year	URL
1.	Cryptography and Network Security	NPTEL	2017	http://nptel.ac.in/courses/106105031/
2.	Cryptography 1	Coursera	2019	https://www.coursera.org/course/crypto

B   Course Outcomes

At the end of the course the student will be able to

CO1	**Apply** number theory concepts to the field of cryptography.
CO2	**Analyze** various symmetric and asymmetric cryptosystems and types of attacks on these cryptosystems.
CO3	**Apply** the field of cryptography while **designing** security applications.
CO4	**Demonstrate** cryptography encryption and decryption techniques using CrypTool.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2														
CO2		3													
CO3			1												1
CO4				2	3										

D   Proposed Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	--	--
Lab Component	--	--
Alternate Assessment Tool	ONE	10
Total		50

E   **Tutorial Plan** *(if applicable)*

Tutorial #	Topic
1	**Open SSL Library Features and Application in Cryptography** **https://www.openssl.org/docs/**
2	**Introduction to CrypTool and Installation** **Demonstration of basic features available in CrypTool**
3	**Demonstration of Caesar cipher** In the message to decode, any punctuation is left unchanged in the encoded message, as too are any numbers. To change this **Options > Text Options** and from here you can select what attributes of a message the cipher will alter and which it will leave unchanged. Experiment encrypting the same message with the Caesar cipher with different settings selected from the text options. Decipher each message after doing so and see if the deciphered message still has the same punctuation, spacing etc.
4	**Demonstration of Vigenere cipher** Animal is a tool within the CrypTool that displays the concepts behind a cipher in a user friendly fashion, by the means of an animation. Demonstrate the use of animal tool for the above cipher.
5	**Demonstration of DES** Open a new file and type a plaintext message. Next click from the menu **Crypt/Decrypt > Symmetric (modern) > DES (ECB)…** This presents a key selection window, this key must be 64 bits long, which equates to 16 hexadecimal figures. For simplicity use the default key of: 00 00 00 00 00 00 00 00 Select **Encrypt** and there should be presented a window showing the data encrypted in hexadecimal form and its corresponding ASCII representation. To decrypt the message again select **Crypt/Decrypt > Symmetric (modern) > DES (ECB)…** Use the same key and select **Decrypt**, and the original message will be displayed in hexadecimal representation. Selecting **View > Show as text** displays it in ASCII; you may also notice some of the formatting is lost in the process or some padding is added. Encrypt the same message using the same process as above only selecting **Crypt/Decrypt > Symmetric (modern) > DES (CBC)…** instead. Compare the two encrypted messages.
6	**Compare ECB versus CBC mode of operation for the following applications:** a) **An online bank statement** b) **An encrypted VoIP session** c) **Viewing of a website using TCP/IP**
7	**Demonstrate DES encryption and decryption using Animal.**
8	**Demonstration of RSA** Now, encrypt a message of your choice using the values: $p = 59, q = 71, e = 13$ Observe the results. Encrypt the same message with the values: $p = 673, q = 619, e = 13$
9	**Demonstrate RSA encryption and decryption using Animal.**
10	**Demonstrate RSA implementation using PKI.**
11	**1963497163 is the product of two prime numbers, use tools within the CrypTool to find these two prime numbers. Mention what tools you used to do this.**
12	**Demonstrate hybrid encryption** Combine aspects of AES and RSA algorithm and demonstrate encryption of different plaintext.
13	**Demonstration of** OWASP vulnerabilities

F   **Laboratory Plan** *(if applicable)*

G   **Alternate Assessment Tool Plan** *(if applicable)*

PLAN:

Students are supposed to develop a Cryptographic algorithm/Digital Signature (using C/C++ preferably) without using libraries or built-in functions. Code demonstration along with a report has to be submitted.

Example: Implement of RSA Digital Signature, Elgamal Digital Signature, Diffie Hellman Signature, Modified RSA algorithm for practical purpose, Hybrid encryption schemes.

Sl. No	Week	Activity
1	1st and 2nd	Formation of groups. Note: Student groups of size 2 members only
2	3rd	AAT topic selection by each group
3	4th	Presentation: Student team and topic introduction by each group
4	5th, 6th	Design the workflow along with Front-end Design
5	7th	Presentation on Front-end Design of the application
6	8th, 9th, 10th	Design and Development of the actual algorithm and testing it for various test cases.
7	11th	Complete code demonstration
8	12th	AAT Report Preparation

Rubrics used for evaluation:

Criteria	Exemplary	Proficient	Partially Proficient	Points
User Interface / Front End Design	(1) The designed application has an exceptional design, attractive and usable interface. It is easy to locate all important elements.	(0.75) The designed application has an attractive design and usable interface. It is easy to locate all important elements.	(0.5) The designed application has a usable design interface, but may appear busy or boring. It is easy to locate most of the important elements.	___ / 1
Implementation of the Algorithm	(4) Implementation of the algorithm has been done accurately without the usage of any library functions.	(2.5) Implementation of the algorithm has been done appropriately without the usage of any library functions.	(1.5) Implementation of the algorithm has been done with usage of few library functions.	___ /4
Testing for various cases	(1) The implemented algorithm works for any given valid input.	(0.75) The implemented algorithm works for almost all valid inputs.	(0.5) The implemented algorithm works for any some valid inputs.	___ /1

Application/Relevance	(1) The designed algorithm has several applications and is relevant in the area of cryptography.	(0.75) The designed algorithm has few applications and is relevant in the area of cryptography.	(0.5) The designed algorithm has few applications and is not very relevant in the area of cryptography.	___ /1
Report	(1) Clear and Effective writing and adherence to appropriate style guidelines	(0.75) Writing that is clear and effective for the most part and minor errors in adherence to appropriate style guidelines	(0.5) Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines	___/1
Oral communication (presentation)	(1) Clear and effective communication	(0.75) Communication is clear	(0.5) Unclear communication	___/1
Participation in Discussions	(1) Provided many good ideas; inspired others; clearly communicated ideas, needs, and feelings.	(0.75) Participated in discussions; on some occasions, made suggestions.	(0.5) Listened mainly; Rarely spoke up, and ideas were off the mark.	___/1
Total				__/ 10

H   SEE Exam Question paper format

Unit-1	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem	6th
Course Title:	Object Oriented Modelling and Design		
Course Code:	20CS6PCOMD		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction, Modeling Concepts, Class Modeling:** What is Object Orientation? What is OO development? OO themes, Evidence for usefulness of OO development, OO modelling history, Modeling as Design Technique, Modeling, Abstraction, The three models. **Class Modeling:** Object and class concepts, Link and associations concepts, Generalization and inheritance, A sample class model, Navigation of class models.	7	**Text Book 1** **Chapter 1: 1.1, 1.2, 1.3, 1.4, 1.5** **Chapter 2: 2.1, 2.2, 2,2.3** **Chapter 3: 3.1,3.2, 3.3,3.4,3.5**
2	**Advanced Class Modeling, State Modeling:** Advanced object and class concepts, Association ends, N-ary associations, Aggregation, Abstract classes; Multiple inheritance, Metadata, Reification, Constraints, Derived data, Packages, Practical tips. **State Modeling:** Events, States, Transitions and Conditions, State diagrams, State diagram behaviour.	7	**Text Book 1** **Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12** **Chapter 5: 5.1, 5.2, 5.3, 5.4, 5.5**
3	**Advanced State Modeling, Interaction Modeling: Advanced State Modeling:** Nested state diagrams, Nested states, Signal generalization, Concurrency, A sample state model; Relation of class and state models. **Interaction Modeling**: Use case models, Sequence models, Activity models. Use case relationships, Procedural sequence models, Special constructs for activity models.	7	**Text Book 1** **Chapter 6: 6.1, 6.2, 6.3, 6.4, 6.5, 6,6** **Chapter 7: 7.1, 7.2, 7.3** **Chapter 8: 8.1, 8.2, 8.3**
4	**Process Overview, System Conception, Domain Analysis, Application Analysis:** **Process Overview:** Development stages, Development life cycle. **System Conception**: Devising a system concept, Elaborating a concept, Preparing a problem statement. **Domain Analysis:** Overview of analysis, Domain class model; Domain state model, Domain interaction model, Iterating the analysis. **Application Analysis:** Application interaction model, Application class model, Application state model, Adding operations.	9	**Text Book 1** **Chapter 10: 10.1, 10.2** **Chapter 11: 11.1, 11.2,11.3** **Chapter 12: 12.1, 12.2, 12.3, 12.4, 12.5** **Chapter 13: 13.1,13.2, 13.3, 13.4**

| 5 | **System Design, Class Design, Implementation Modeling:**
Overview of system design, Estimating performance, Making a reuse plan, Breaking a system in to sub-systems, Identifying concurrency, Allocation of sub-systems, Management of data storage, Handling global resources, Choosing a software control strategy, Handling boundary conditions, Setting the trade-off priorities, Common architectural styles, Architecture of the ATM system as the example.

Class Design: Overview of class design, Bridging the gap, Realizing use cases, Designing algorithms, Recursing downwards, Refactoring, Design optimization, Reification of behaviour, Adjustment of inheritance, Organizing a class design, ATM example.

Implementation Modeling: Overview of implementation, Fine-tuning classes, Fine-tuning generalizations, Realizing associations, Testing. | 9 | **Text Book 1**

Chapter 14: 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, 14.13

Chapter 15- 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 15.10, 15.11

Chapter 17: 17.1, 17.2, 17.3, 17.4, 17.5 |

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	"Object-Oriented Modeling and Design with UML"	Michael Blaha, James Rumbaugh	Second Edition	Pearson Education	2005

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Project Management for Business, Engineering and Technology	Nicholas, J. and Steyn	Second Edition	H., ELSEVIER.	2004
2.	Project Planning, Analysis, Selection, Implementation and Review	Prasanna Chandra	Ninth Edition	New Delhi, Tata McGraw Hill Publications	2000

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Object-Oriented Analysis and Design with Applications	Grady Booch et al	3rd Edition	Pearson Edition	2005	https://zjnu2017.github.io/OOAD/reading/Object.Oriented.Analysis.and.Design.with.Applications.3rd.Edition.by.Booch.pdf
2.	Object-Oriented Analysis, Design, and Implementation	Brahma Dathan, Sarnath Ramnath	2nd Edition	University press	2009	https://link.springer.com/book/10.1007/978-3-319-24280-4

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Object oriented analysis and design	Swayam NPTEL	2019	https://swayam.gov.in/nd1_noc19_cs48/preview
2.	Object-Oriented Design	Coursera	2020	https://www.coursera.org/learn/object-oriented-design?action=enroll

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to apply the knowledge of class, State & Interaction Modelling using Unified Modeling Language to solve a given problem.
CO2	Ability to analyze a System for a given requirement using Unified Modeling language.
CO3	Ability to design a given system using high level strategy.
CO4	Ability to conduct practical experiment to solve a given problem using Unified Modeling language.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3														
CO2		3											3		
CO3			3												
CO4				3	3								3		

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	Two	20
QUIZ	One	5
Lab Component	Lab Test + Continuous Evaluation	25
Self-Study Component	---	---
AAT	---	---
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*
    Lab Plan
    Instructions to Students to be followed in each OOMD lab:

1. Each Student should write down the work carried out and the outputs in the observation book and get it evaluated by the respective lab faculty in-charge.

2. Each Student Should bring the lab record with the programs and output written for the programs completed in their respective previous week and gets it evaluated by the lab faculty in-charge.

3. Design UML diagram for the following applications. SRS for the applications should be provided to the students by the faculty in charge except question no. 6 and 11.

Experiment #	Name of Experiment
1	Coffee Vending machine
2	Hotel Management system
3	Graphics Editor
4	Credit card processing
5	Library Management system
6	The Student should prepare SRS for the project completed under Project work 2 (19CS4PWPW2) and design UML diagram
7	Stock maintenance system
8	Passport automation system
9	Railway reservation system
10	Online Shopping system
11	Banking system
12	The Student should prepare SRS for the project completed under Project work 3 (20CS5PWPW3) and design UML diagram

The continuous evaluation for the lab is done as follows:
- The faculty should evaluate each lab program for 10 marks in every lab.
- Final continuous evaluation marks will be calculated for 25 marks: (10 marks lab programs + 15 marks for lab test)

Note: Open ended question should be given to the students during lab test

G   **Alternate Assessment Tool Plan** *(if applicable)*

H   **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	15%
Apply / Analyze	35%
Create / Evaluate	50%

B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	6th
Course Title:	Management and Entrepreneurship			
Course Code:	20CS6HSMGE			
L-T-P:	3-0-0		Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Introduction:** Definition of Management, Managing: Science or Art, Patterns of Management Analysis: A management theory jungle, The system approach to management process, The functions of managers.	6	**Text book no.-1 Chap-1 Page No. 4-15 16-27**
2	**Planning**: Essentials of Planning and Managing by Objectives. **Decision Making**. **Organizing**: Formal and informal organization, Organizational Division, Organizational Levels and the span of management, Reengineering the organization, Structure and process of organizing; Line/Staff Authority, Empowerment and Decentralization.	9	**Text book no.-1 Chap-4 Page No. 96-111 Chap-6 Page No. 138-151 Chap-7 Page No. 174-179 182-186 Chap-9 Page No. 207-215**
3	**Staffing**: Definition of staffing, The system approach to human resource management: An overview of staffing function, Situational factors affecting staffing, the system approach to selection: An overview. **Leadership**: Defining Leadership, Ingredients of Leadership, Trait approaches to leadership, Leadership behaviour and styles	8	**Text book no.-1 Chap-11 Page No. 244-259 Chap-15 Page No. 351-362**
4	**Entrepreneurship**: Importance of entrepreneurship, concepts of entrepreneurship, characteristics of a successful entrepreneur, classification of entrepreneurs, myths of entrepreneurship, entrepreneurial development models, problems faced by entrepreneurs and capacity building for entrepreneurship. **Women Entrepreneurs:** Women entrepreneurship defined, women entrepreneurship environment, challenges in the path of women entrepreneurship, strategies for development of women entrepreneurs.	8	**Text book no.-2 Chap-2 Page No 49-86 Chap-3 Page No 99-109**
5	**Creativity and business idea**: Ideas from Trends analysis: Trends, sources of new ideas, methods of generating ideas. **Innovation:** Entrepreneurial innovation, opportunity recognition, product planning and development process, e-Commerce and business start-up. **The Business plan**: What is business plan, who should write the plan, scope and value of business plan, Writing the business plan, Using and implementing the business plan.	8	**Text book no. -3 Chap-4 Page No 99-114 Page No 121-138 Chap-7 Page No 224-235, 243-256**

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Management: A Global and Entrepreneurial Perspective	Heinz weihrich, Mark V Cannice, Harold Koontz	13th Edition	Tata McGraw Hill,	2011
2	Entrepreneurship Development-Small Business Enterprises.	Poornima M. Charantimath,	--	Pearson Education	2009
3	ENTREPRENEURSHIP	Robert D Hisrich, Mathew J Manimala, Michael P Peters, Dean A Shepherd	9th Edition	Tata McGraw Hil	2014

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Principles of Management	P.C.Tripathi, P.N.Reddy	4th Edition,	Tata McGraw Hill	2010
2.	Dynamics of Entrepreneurial Development & Management	Vasant Desai	--	Himalaya Publishing House	2011
3.	Entrepreneurship Development	S.S. Khanka, S Chand & Co	--	---	2007

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	--	---	---	---	---	---

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Entrepreneurship Specialization	Coursera	2020	https://www.coursera.org/specializations/wharton-entrepreneurship
2	Business Management innovation-entrepreneurship	edx	2020	https://www.edx.org/course/subject/business-management/innovation-entrepreneurship

B **Course Outcomes**

At the end of the course the student will be able to

CO1	Ability to apply Engineering knowledge to effectively exhibit managerial skills at different levels of management in a global context
CO2	Ability to demonstrate the critical awareness of the principles and importance of entrepreneurship
CO3	Ability to Examine the process of creating and managing a new business venture and prepare a business plan for any identified business problem

C   **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												3		
CO2		3													
CO3			3						2	3	2	2			

D   **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internals	Two	40
QUIZ	Two	10
Lab Component	--	--
Alternate Assessment Tool	--	--
Total		**50**

E   **Tutorial Plan** *(if applicable)*

F   **Laboratory Plan** *(if applicable)*

G   **Alternate Assessment ToolPlan***(if applicable)*

H   **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Mandatory	One Question to be asked for 20 Marks
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem	6th
Course Title:	Computer Graphics & Visualization			
Course Code:	20CS6PECGV			
L-T-P:	3-0-1		Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Overview of Graphics Systems:** Raster-Scan Systems, Graphics Software, Introduction to OpenGL. **Interactive Input Methods and Graphical User Interfaces:** Graphical Input Data, Logical Classification of Input, Input Function for Graphical Data, Interactive Picture-Construction Techniques, Virtual-Reality Environments, OpenGL Interactive Input-Device Functions, OpenGL Menu Functions **Computer Animation:** Raster Methods for Computer Animation, OpenGL Animation Procedures	7	**TextBook1:** **Chapter 2 - 2.2, 2.8, 2.9** **Chapter 11 - 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7** **Chapter13 - 13.1, 13.10**
2	**Attributes of Graphics Primitives:** OpenGL State Variables, Color and Gray Scale, OpenGL Color Functions, Point Attributes, Line Attributes, Curve Attributes, OpenGL Point-Attribute Functions, OpenGL Line-Attribute Functions, Fill-Area Attributes, General Scan-Line Polygon-Fill Algorithm, Scan-Line Fill for Convex Polygons, Open-GL Antialiasing Functions. OpenGL Query Functions **Geometric Transformations:** Basic Two-Dimensional Geometric Transformations, Matrix Representations and Homogeneous Coordinates, Inverse Transformations, Two-Dimensional Composite Transformations, Other Two-Dimensional Transformations, Transformations Between Two-Dimensional Coordinate System, Geometric Transformation in Three-Dimensional Space, Three-Dimensional Translation, Three-Dimensional Rotation, Three-Dimensional Scaling, Composite Three-Dimensional Transformations, OpenGL Geometric-Transformation Functions	8	**TextBook1:** **Chapter 4 - 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4 .18, 4.19** **Chapter 5 - 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.17**
3	**Two-Dimensional Viewing:** The Two-Dimensional Viewing Pipeline, The Clipping Window, Normalization and Viewport, OpenGL Two-Dimensional Viewing Functions, Clipping Algorithms, Two-Dimensional Point Clipping, Two-Dimensional Line Clipping (Cohen-Sutherland Line Clipping and Liang-Barsky Line Clipping), Polygon Fill-Area Clipping (Sutherland- Hodgman Polygon Clipping)	8	**TextBook1:** **Chapter 6 - 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8**
4	**Three-Dimensional Viewing:** Transformation from World to Viewing Coordinates, Projection Transformations, Orthogonal Projections, Perspective Projections, OpenGL Three-Dimensional Viewing Functions	8	**TextBook1:** **Capter7 - 7.4, 7.5, 7.6, 7.8, 7.9, 7.10**

| 5 | **Graphics Output Primitives:** Coordinate Reference Frames, Specifying a Two-Dimensional World-Coordinate Reference Frame in OpenGL, OpenGL Point Functions, OpenGL Line Functions, Line-Drawing Algorithms, Circle-Generating Algorithms, OpenGL Polygon Fill-Area Functions, OpenGL Vertex Arrays, Pixel-Array Primitives, OpenGL Pixel-Array Functions, Character Primitives, Picture Partitioning, OpenGL Display Lists, OpenGL Display-Window Reshape Function

Visible-Surface Detection: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Method, OpenGL Visibility-Detection Functions | 8 | **TextBook1:**
Chapter 3 - 3.1, 3.2, 3.3, 3.4, 3.5, 3.9, 3.16, 3.17, 3.18, 3.19, 3.20, 3.21, 3.22, 3.23, 3.24
Chapter 9 - 9.1, 9.2, 9.3, 9.14 |

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Computer Graphics with OpenGL	Donald Hearn & M Pauline Baker	Third Edition	Pearson	2009

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Computer Graphics using OpenGL	FS Hill & Stephen M Kelley	3rd Edition	Pearson Education	2009
2.	Interactive Computer Graphics – A Top-down Approach using Opengl	Edward Angel	6th Edition	Pearson Education	2012

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Graphics Programming Black Book	Michael Abrash	----	----	----	https://www.drdobbs.com/parallel/graphics-programming-black-book/184404919
2.	Learn OpenGL	Joey de Vries	----	----	----	https://unglue.it/work/146302/

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Interactive Computer Graphics	Coursera	2019	https://www.coursera.org/learn/interactive-computer-graphics
2.	Computer Graphics	NPTEL	2009	https://nptel.ac.in/courses/106106090/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to **apply** the knowledge of geometric transformations and viewing.
CO2	Ability to **analyze** graphical outputs.
CO3	Ability to **design** graphic applications.
CO4	Ability to **conduct** practical experiments to solve problems using appropriate techniques of computer graphics.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		1													
CO3			3												2
CO4				3	3										3

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	20
QUIZ	ONE	5
Lab Component	Two Lab Tests + Continuous Evaluation	25
Alternate Assessment Tool	--	--
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

Instructions:

a) Design and develop graphical solutions using OpenGL for the following problems.
b) Lab Record - Handwrite programs and output print out.

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Note: The faculty in charge of Computer Graphics course of all the sections must come up with some graphical outputs/animations which can be generated through the concepts/algorithms learnt in the theory course in addition to the programs in the laboratory set at the beginning of the semester. The students are expected to write the algorithm /program to generate these outputs. Depending on the output generated by the student the evaluation for the week must be done.

Lab Program	Unit #	Program Details
1	1,5	Program to recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.
2	1	Program to display a set of values { f_{ij} } as a rectangular mesh.
3	1,2	Program to create a cylinder and a parallelepiped by extruding a circle and quadrilateral respectively. Allow the user to specify the circle and the quadrilateral.
4	1,2,5	Program to draw a color cube and spin it using OpenGL transformation matrices.
5	1,2	Program to create a house like figure and rotate it about a given fixed point using OpenGL functions.
6	1,3,5	Program to draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing. Use OpenGL functions.
7	1,3	Program to fill any given polygon using scan-line area filling algorithm. (Use appropriate data structures.)
8	1,3	Program to implement the Cohen-Sutherland line-clipping algorithm. Make provision to specify the input line, window for clipping and view port for displaying the clipped image.
9	1,4,5	Program, using OpenGL functions, to draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene.
10	1,3	Program to implement Liang-Barsky line clipping algorithm.

G   Proposed Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	15%
Apply / Analyze	60%
Create / Evaluate	25%

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DEPARTMENT OF CSE

Academic Year	Aug-Dec 2019/Jan-May 2020	Sem.	6th
Course Title:	Big Data Analytics		
Course Code:	20CS6PEBDA		
L-T-P:	3-0-1	Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Types of Digital Data: Classification of Digital Data. Introduction to Big Data: Characteristic of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data?. Big Data Analytics: Where do we Begin?, What is Big Data Analytics?, What Big Data Analytics isn't?, Classification of Analytics, Terminologies Used in Big Data Environments. The Big Data Technology Landscape: NoSQL,	9	**Book 1: 1.1, 2.1-2.5, 3.1-3.5, 3.12, 4.1,**
2	Introduction to Cassandra: Apache Cassandra – An Introduction, Features of Cassandra, CQL Data Types, CQLSH, Keyspaces, CRUD, Collections, Using a Counter, Time to Live, Alter Commands, Import and Export.	7	**Book 1: 7.1-7.11**
3	Hadoop Overview, HDFS (Hadoop Distributed File System), Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator). Introduction to MAPREDUCE Programming: Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression.	9	**Book 1: 5.7, 5.10-5.12, 8.1-8.8**
4	Introduction to Data Analysis with Spark: What ia Apache Spark, A unified Spark, Who uses Spark and for what?, A Brief History of Spark, Spark version and releases, Storage layers for Spark. Programming with RDDs: RDD Basics, Creating RDDs, RDD Operations, Passing functions to Spark, Common Transformations and Actions, Persistence. Spark SQL: Linking with Spark SQL, Using Spark SQL in Applications, Loading and Saving Data, JDBC/ODBC Server, User-defined functions, Spark SQL Performance. Scala: The Basics, Control Structures and functions, Working with arrays, Maps and Tuples	8	**Book2: 1, 3, 9** **Book4: 1, 2, 3, 4**
5	Use case Study: Recommendation Systems: Introduction, A Model for Recommendation Systems, Collaborative Filtering System and Content Based Recommendations.	7	**Book3: 10.1-10.4**

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Big Data and Analytics	Seema Acharya, Subhashini Chellappan	First	Wiley	2015
2	Learning Spark Lightning-Fast Big Data Analysis	Andy Konwinski, Holden Karau, MateiZaharia, Patrick Wendell	First	O'Reilly	2015
3	Big Data Analytics	Radha Shankarmani, M Vijayalakshmi	Second	Wiley	2017
4	Scala for the Impatient	Cay S. Horstmann	Second	Addison-Wesley	2017

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Big data analytics with R and Hadoop	VigneshPrajapati	First	SPD	2013
2.	Hadoop Operations	Eric Sammer	First	O'Reilly	2012

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Hadoop: The Definitive Guide	Tom White	First	O'Reilly	2009	http://index-of.co.uk/Big-Data-Technologies/Big%20Data%20Analytics%20with%20R%20and%20Hadoop.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Big Data Computing	NPTEL	2018	https://nptel.ac.in/courses/106104189/
2.	Big Data Fundamentals	Edx	2020	https://www.edx.org/course/big-data-fundamentals
3.	Big Data Specialization	Coursera	2020	https://www.coursera.org/specializations/big-data

B   Course Outcomes

At the end of the course the student will be able to

CO1	Apply the concept of NoSQL, Hadoop or Spark for a given task
CO2	Analyze the Big Data and obtain insight using data analytics mechanisms.
CO3	Design and implement Big data applications by applying NoSQL, Hadoop or Spark

C **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3									2	
CO2		3			3									2	
CO3			3		3									2	

D **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internal Test	Two	20
Quiz	One	05
Lab Component	Two lab tests + Continuous Evaluation	25
Alternate Assessment Tool	--	-
Total		**50**

E **Tutorial Plan** *(if applicable)*

F **Laboratory Plan** *(if applicable)*

BIG DATA AND ANALYTICS Lab - Plan of Activities

1. Demonstration and installation of HADOOP single node cluster
2. Student should be able to install Cassandra and Spark.
3. Execution of Lab programs and submission of lab report.

Evaluation: 25 Marks; Lab Test – Writing and execution of lab programs

Note:

a) Question Number 3, 5, 11, 12 are Open Ended Questions.

b) The course handling faculty will provide guidelines to execute the problem.

Experiment #	Unit #	Name of Experiment	Remarks
1.	2	Create a Data set either structured/Semi-Structured/Unstructured from twitter/Facebook etc. to perform various DB operations using Cassandra. (Use FacePager app to perform real time streaming)	
2.	2	Create a Data set either structured/Semi-Structured/Unstructured from twitter/Facebook etc. to perform various DB operations using Cassandra. (Use FacePager app to perform real time streaming)	
3.	2	Students should be classifying a dataset into one of the standard forms and apply suitable querying rules to obtain suitable results.	Open Ended Question
4.	3	Execution of HDFS Commands for interaction with Hadoop Environment. (Minimum 10 commands to be executed)	
5.	3	Students should be able identify the HDFS concept and apply relevant Hadoop framework to extract relevant data from the dataset provided.	Open Ended Question
6.	3	From the following link extract the weather data https://github.com/tomwhite/hadoop-book/tree/master/input/ncdc/all Create a Map Reduce program to a) find average temperature for each year from NCDC data set. b) find the mean max temperature for every month	
7.	3	For a given Text file, Create a Map Reduce program to sort the content in an alphabetic order listing only top 10 maximum occurrences of words.	

8.	3	From the following link extract the user data http://content.udacity-data.com/course/hadoop/forum_data.tar.gz Create a Map Reduce program to combine information from the users file along with Information from the posts file by using the concept of join and display user_id, Reputation and Score.	
9.	4	From the following link extract the user data https://github.com/rvanrijn/spark-workshop/blob/master/data/reduced-tweets.json Design a Cluster computing framework using Spark to extract the number of tweets by an individual user and find the number of individual tweets.	
10.	4	Using RDD and FlaMap count how many times each word appears in a file and write out a list of words whose count is strictly greater than 4 using Spark.	
11.	4	Students should apply cluster computing framework to appreciate the unique feature of Spark	Open Ended Question
12.	4	Students should be able to invoke APIs of Scala on Spark to understand streaming data.	Open Ended Question

G **Alternate Assessment Tool Plan** *(if applicable)*

H **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Questions to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Internal Choice	Two Question to be asked for 20 Marks each
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	30%
Apply / Analyze	45%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem	6th
Course Title:	Natural Language Processing			
Course Code:	20CS6PENLP			
L-T-P:	3-0-1		Total Credits:	4

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**OVERVIEW AND LANGUAGE MODELING** Overview: Origins and challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Information Retrieval. Language Modeling: Various Grammar - based Language Models, Statistical Language Model.	8	**Text Book 1: Chapter 1 and Chapter 2**
2	**WORD LEVEL AND SYNTACTIC ANALYSIS** Word Level Analysis: Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and correction, Words and Word Classes, Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar, Constituency, Parsing, Probabilistic Parsing.	8	**Text Book 1: Chapter 3 and Chapter 4**
3	**SEMANTIC ANALYSIS AND DISCOURSE PROCESSING** Semantic Analysis: Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: Cohesion, Reference Resolution, Discourse Coherence and Structure.	8	**Text Book 1: Chapter 5 and Chapter 6**
4	**NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION** Natural Language Generation: Architecture of NLG Systems, Generation Tasks and Representations, Application of NLG, Machine Translation: Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages.	7	**Text Book 1: Chapter 7 Chapter 8: 8.1, 8.2, 8.3, 8.4, 8.9**
5	**INFORMATION RETRIEVAL AND LEXICAL RESOURCES** Information Retrieval: Design features of Information Retrieval Systems, Information Retrieval Models, Classical Information Retrieval Models, Non-classical models of IR, Alternative Models of IR, Evaluation of the IR System, Lexical Resources: Word Net, Frame Net, Stemmers, Part-of-Speech Tagger, Research Corpora	8	**Text Book 1: Chapter 9 and Chapter 12**

Prescribed Text Book					
Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Natural Language Processing and Information Retrieval	Tanveer Siddiqui, U.S. Tiwary	1st Edition	Oxford University press	2008

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition	Daniel Jurafsky and James H Martin	2nd Edition	Prentice Hall	2008
2.	Natural Language Understanding	James Allen	2nd Edition	Benjamin /Cummings publishing company	1995

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1	Natural Language processing with python – Analyze text with the natural language toolkit	Steven bird, Ewan Klen and Edward Loper	1st Edition	O'Reilly	2009	www.nltk.org/book_1ed/

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	Natural Language Processing	IIT Bombay	2012	https://nptel.ac.in/courses/106101007/
2.	Natural Language Processing	IIT Kharagpur	2017	https://nptel.ac.in/courses/106/105/10605158/

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to apply information retrieval techniques
CO2	Ability to analyze the natural language text
CO3	Ability to conduct practical experiment to perform natural language processing and information retrieval

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3														
CO2		3											3		
CO3				3	3										

Indicate strength of mapping (1/2/3) with justification

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	20
QUIZ	ONE	5
Lab Component	Lab Test + Continuous Evaluation	25
AAT	---	---
Total		50

E   Tutorial Plan *(if applicable)*

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F   Laboratory Plan *(if applicable)*

Instructions to Students to be followed in each NLP lab:

1. Each Student should write down the work carried out and the outputs in the observation book and get it evaluated by the respective lab faculty in-charge.

2. Each Student should bring the lab record with the programs and outputs written for the programs completed in their respective previous week and get it evaluated by the lab faculty in-charge.

3. Write a program for the following concepts using Python NLTK package (Order of the programs depend on the instructor of the subject)

Note:

The student should develop two open ended applications based on the concept learned in the course. The open ended questions should be evaluated as like regular lab exercise.

The continuous evaluation for the lab is done as follows:
- 10 marks for each lab program and 10 marks for open-ended questions.
- Final continuous evaluation marks will be calculated for 10 marks: (10 marks lab programs + 10 marks open-ended)/2
- Lab Test: The faculty should give open ended application to evaluate the student for 15 marks

Experiment #	Name of Experiment
1	Data Retrieval with Web Scraping
2	Text wrangling and pre-processing
3	POS (Part-Of-Speech) Tagging & Chunking
4	Stemming and Lemmatization
5	Tagging Problems and Hidden Markov Model
6	Counting POS Tags, Frequency Distribution & Collocations
7	Remove stop words from a given text.
8	Omit few given stop words from the stop-words list
9	Find the definition and examples of a given word using WordNet.
10	Find the sets of synonyms and antonyms of a given word.
11	Get overview of the tag-set, details of a specific tag in the tag-set and details on several related tag-sets, using regular expression.
12	Compare the similarity of two given nouns and verbs

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	15%
Apply / Analyze	35%
Create / Evaluate	50%

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DEPARTMENT OF CSE

Academic Year	Aug-Dec 2020/Jan-May 2021	Sem.	6th
Course Title:	Java Programming		
Course Code:	20CS6OEJVP		
L-T-P:	3-0-0	Total Credits:	3

A **Syllabus**

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	Introduction of Java: How Java changed the Internet Java is interpreted, Java's Magic: Byte code, Java Buzz Words. Overview of Java, First Simple Program. Data types, Variables and Arrays: Java is strongly typed language, Integers, Floating Point Types, Characters, Booleans, Variables, Arrays-One Dimensional ,Multidimensional Arrays, Alternative Array Declaration syntax Control Statements: Selection statements, iteration statements, Jump statements. Introducing Classes-class Fundamentals, Declaring Objects, Introducing Methods, Constructors, this keyword, Garbage Collection, finalize() method. Closer Look at Methods and Classes: Overloading Methods, Using Objects as parameters, A closer look at Argument passing, Returning Objects, Introducing Access Control, Understanding static, Introducing Final, Arrays Revisited, Inner classes.	8	Text Book 1: Chapter 1, Chapter 2, Chapter 3, Chapter 5, Chapter 6, Chapter 7.
2	Inheritance: Inheritance Basics, Using super, multilevel hierarchy, dynamic method dispatch, Using abstract class, Using final with inheritance. Packages: Defining a package, Finding packages and class path, Example, Access protection, importing packages. Interfaces: Defining Interface, Implementing Interface, Nested Interfaces, Applying interfaces, Variables in interfaces. Interfaces can be Extended.	8	Text Book 1: Chapter 8, Chapter 9.
3	Enumeration: Enumeration Fundamentals, value() and valueOf() Methods, Java Enum's are class types. I/O Basics: Streams: Byte Streams and Character Streams, Predefined Streams, Reading Console Input .Reading Characters, Reading Strings, Writing Console Output, Reading and Writing Files. String handling: String Constructors, Special string operations, character extraction, string comparison, searching strings, modifying a string, String Buffer, additional string buffer methods.	7	Text Book 1: Chapter 12, Chapter 13, Chapter 17.
4	Exception handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions. Creating your own exception subclasses. Multithreaded Programming: Introduction to Process, Difference between Process and Threads, Java thread model, main thread, creating thread, creating multiple threads, using isalive() and Join(), thread priorities, synchronization, Interthread communication, suspending, resuming and stopping threads.	8	Text Book 1: Chapter 10, Chapter 11.

5	Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Events- Event Sources, Event Listeners, Key Event Class-The Mouse Event Class, Text Event class Event Listener Interfaces-The Mouse Listener Interface. Abstract window toolkit: Window Fundamentals, Working with Frame windows, Creating a Frame Window in an AWT-Based Applet-Handling Events in a Frame Window, Creating windowed Program. Introducing Graphics-Drawing Lines, Rectangles, Ellipses and Circles, Arcs.	8	Text Book 1: Chapter 24, Chapter 25

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Java the Complete Reference.	Herbert Schildt	Eleventh Edition	Tata McGraw-hill Edition.	2019

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to JAVA Programming	Y. Daniel Liang	Ninth Edition	pearson education	2012
2.	Programming in JAVA 5.0	James P Cohoon, Jack W Davidson	1st Edition	Tata McGrawHill Edition	2019
3.	Programming with Java A Primer	E.BalaGuruSwamy	Fifth Edition	McGraw Hill Education	2014

E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Java Object Oriented Problem Solving	R. Morelli and R. Walde	Third Edition	Pearson Education Inc	2012	https://ia800303.us.archive.org/26/items/JavaJavaJavaObject-orientedProblemSolving/jjj-os.pdf
2.	The Art and Science of Java	Eric S. Roberts	Greg Tobin	----	2007	http://people.reed.edu/~jerry/121/materials/artsciencejava.pdf
3.	Java Programming	Wikibooks Contributors	Seventh Edition	wikibooks.org	2016	https://upload.wikimediaorg/wikipedia/commons/e/e7/Java_Programming.pdf
4.	Think Java How to Think Like a Computer Scientist	Allen B. Downey and Chris Mayfield	6.1.3	Green Tea Press Needham, Massachusetts	2016	https://www.pdfdrive.com/think-java-how-to-think-like-a-computer-scientist-e17327018.html
5	Introduction to Programming Using Java,	David J. Eck	Seventh Edition	Create Space	2014	http://math.hws.edu/javanotes/index.html.

MOOC Course				
Sl. No.	Course name	Course Offered By	Year	URL
1.	Object Oriented Programming in Java	Coursera	2019	https://www.classcentral.com/course/coursera-object-oriented-programming-in-java-4212
2.	Java Programming Basics	Udacity	2019	https://www.udacity.com/course/java-programming-basics--ud282.
3.	Programming in Java	NPTEL	Aug – Oct 2019	https://onlinecourses.nptel.ac.in/noc18_cs41

B **Course Outcomes**

At the end of the course the student will be able to

CO1	Apply knowledge of java constructs for developing programs/applications
CO2	Analyse the given java program to identify bugs and to write correct code.
CO3	Design java programs/ applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of java using eclipse.

C **CO-PO-PSO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1													1	
CO2		2												1	
CO3			3											1	1
CO4			2		3									1	

D **Assessment Plan (for 50 marks of CIE)**

Tool	Remarks	Marks
Internals	TWO	40
QUIZ	ONE	5
Lab Component	---	-
Alternate Assessment Tool	ONE	5
Total		50

E **Tutorial Plan** *(if applicable)*

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F **Laboratory Plan** *(if applicable)*

--

G **Alternate Assessment Tool Plan** *(if applicable)*

Students are supposed to execute and demonstrate Java Program in the Lab based on the concepts taught in the theory class. The Programs will be set by course Instructor. From the List of programs student has to demonstrate any two of them as given by the course instructor.

H   **Alternative Assessment Evaluation Rubrics**

Criteria	Excellent	Good	Unsatisfactory
Design and Implementation of Program (CO2,CO3,CO4,PO2, PO3,PO5)	Able To fully Design and Implement Program using appropriate Java Construct in accordance to the given problem (2)	Able To Moderately Design and Implement Program using appropriate Java Construct in accordance to the given problem (1.5)	Not Able to Design and Implement Program using appropriate Java Construct in accordance to the given Problem(0.5),
Demonstration (CO4,PO 3,5)	Demonstrates the functionality of the program with proper Input and Output using appropriate Tools of Java for all cases.(1)	Demonstrates the functionality of the program with proper Input and Output using appropriate Tools of Java for few cases.(0.5)	Demonstrates the functionality of the program without proper Input and Output using appropriate Tools of Java for few cases.(0)
Viva-Voce (CO1,PO1)	Able to Answer all Viva Questions of the java Concepts (1)	Able to Answer few Viva Questions of the java Concepts(0.5)	Able to Not Answer Viva Questions of the java Concepts(0)
Documentation (CO4,PO3,PO5)	Well written and neatly organized Report showing proper Input and Output (1).	Well written and neatly organized Report without showing proper Input and Output (0.5).	Not Well written and not neatly organized Report without Input and Output (0).

I   **SEE Exam Question paper format**

Unit-1	Mandatory	One Question to be asked for 20 Marks.
Unit-2	Mandatory	One Question to be asked for 20 Marks.
Unit-3	Mandatory	One Question to be asked for 20 Marks.
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each.
Unit-5	Internal Choice	Two Questions to be asked for 20 Marks each.

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	25%
Apply / Analyze	40%
Create / Evaluate	35%

Academic Year	Aug-Dec 2020/Jan-May-2021	Sem	6th
Course Title:	Robot Process Automation Design and Development		
Course Code:	20CS6OERPA		
L-T-P:	3-0-0	Total Credits:	3

A   Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**What is Robotic Process Automation?** **Scope and Techniques of automation:** what should be automated? What can be automated? Techniques of automation **Roboic Process Automation:** What can RPA do? Benefits of RPA Components of RPA, RPA platforms. About UiPath. The future of automation. **Record and Play:** UiPtha stack, Downloading and Installing UiPath Studio, Learning UiPath Studio, Task Recorder, Emptying trash in Gmail, Emptying Recycle Bin.	8	**Text Book 1: Chapter 1 & Chapter 2**
2	**Sequence, Flowchart, and Control Flow:** Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, how to use a sequence, how to use a flowchart, step by step example using sequence and control flow. **Data Manipulation:** Variables and scope, Collections, Arguments-purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example. CSV/Excel to data table and vice versa examples.	8	**Text Book 1: Chapter 3 & Chapter 4**
3	**Taking control of the controls :** Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls-mouse and keyboard activities, working with UiExplorer, Handling events, Revisit recorder, Screen scraping, When to use OCR, Types of OCR available, How to use OCR, Avoiding typical failure points. **Tame that Application with Plugins and Extensions Terminal plugin:** SAP automation, Java Plugin, Citrix automation, Mail plugin, PDF plugin, web integration, Excel and Word plugins, Credential management.	8	**Text Book 1: Chapter 5 & Chapter 6**
4	**Handling User Events and Assistant Bots:** What are assistant bots? Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event. **Exception Handling, Debugging, and Logging Exception handling:** Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting.	8	**Text Book 1: Chapter 7 & Chapter 8**

| 5 | **Managing and Maintaining the Code:** Project Organization, Nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines or sequences, Using config files and examples of a config file.

Deploying and Maintaining the Bot: Publishing using publish utility, Overview of Orchestration Server, Using Orchestration Server to control bots, Using Orchestration Server to deploy bots. | 7 | **Text Book 1:**
Chapter 9
&
Chapter 10 |

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	"Learning Robotic Process Automation"	Alok Mani Tripathi	1st Edition	Packpub.com	2018

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
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E-Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year	URL
1.	Learning Robotic Process Automation	Alok Mani Tripathi	1st Edition	Packpub.com	2018	https://book.akij.net/eBooks/2018/November/5be2a5c7bc9bd/Sanet.st_Learning_Robotic_Proc.pdf

MOOC Course

Sl. No.	Course name	Course Offered By	Year	URL
1.	RPA	UiPath	2016	https://www.uipath.com/developers/video-tutorials
2.	Robotic Process Automation	Guru99.com	----	https://www.guru99.com/uipath-tutorial.html

B   Course Outcomes

At the end of the course the student will be able to

CO1	Apply the concept of Robotic Process Automation to automate various applications.
CO2	Analyse the usage of appropriate Robotic Process Automation technique for a given application.
CO3	Design and implement techniques of Robotic Process Automation.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		3													
CO3			3											2	

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	TWO	40
QUIZ/AAT	TWO	10
Lab Component	--	--
Alternate Assessment Tool	--	--
Total		**50**

E   Tutorial Plan *(if applicable)*

F   Laboratory Plan *(if applicable)*

G   Alternate Assessment Tool Plan *(if applicable)*

H   SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Mandatory	One Question to be asked for 20 Marks
Unit-5	Mandatory	One Question to be asked for 20 Marks

Bloom's Level	Percentage of Questions to be Covered
Remember / Understand	35%
Apply / Analyze	40%
Create / Evaluate	25%

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	6th
Course Title:	Project Work-4			
Course Code:	20CS6PWPW4			
L-T-P:	0-0-2		Total Credits:	2

A   Syllabus

Introduction:

Data Science or Security based application development: Under this project work, student should develop Data Science or Security based Application development using technologies such as Weka, R tool, Cryptool, Wireshark, Nessus, Packet analyser, etc.

- Students can form a group with minimum of two and maximum of four.
  Note: Under this project work, students can form a group with non-CS students of other departments of BMSCE.

- Teacher allotted for project work to students should teach students' technologies like Weka, R tool, Kaggle kernels, during Class/Lab hours as per time table allotment.

- Teacher allotted for project work should guide the students in choosing the topic & towards carrying out project work and complete the evaluation of assigned students.

- The evaluation of project work will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

B   Course Outcomes

At the end of the course the student will be able to

CO1	Ability to apply the practical knowledge and latest tools for the project development.
CO2	Ability to design and develop a project using Data Analytics or Security technologies to solve societal problems.
CO3	Ability to report and present the implemented solutions in a team.

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3										
CO2	3	3	3	2	3	2	2	2				1	1	3	2
CO3								2	3	3					

D   Assessment Plan (for 50 marks of CIE)

Tool	Remarks	Marks
Internals	--	--
QUIZ	--	--
Lab Component	--	50
Alternate Assessment Tool	--	--
Total		**50**

Rubrics for Project Evaluation:

Criteria	Exemplary	Proficient	Partially Proficient	Points
Design of Modules for the application	(10) All modules are designed appropriately in accordance to the requirements.	(6) All modules are designed moderately in accordance to the requirements.	(4) Some of the modules are not designed in accordance to the requirements.	__ / 10
Implementation	(10) Implementation of modules using appropriate analytic techniques/security features for all set objectives.	(6) Implementation of modules using appropriate analytic techniques/security features for most of the set objectives.	(4) Some of the modules are not implemented in accordance with the design.	__ / 10
Demonstration of the project	(10) Demonstrates the functionality of the application using appropriate reports or plots for various cases.	(6) Demonstrates the functionality of the application using appropriate reports or plots for few cases.	(4) Demonstrates the functionality of the application without much reporting.	/ 10
Report	(10) Clear and Effective writing and adherence to appropriate style guidelines	(6) Writing that is clear and effective for the most part and minor errors in adherence to appropriate style guidelines	(4) Unclear and ineffective writing and multiple errors in adherence to appropriate style guidelines	__/ 10
Oral communication. (presentation)	(5) Clear and effective communication	(3) Communication is clear	(2) Unclear communication	/ 5
Participation in Discussions	(5) Provided many good ideas; inspired others; clearly communicated ideas, needs, and feelings.	(3) Participated in discussions; on some occasions, made suggestions.	(2) Listened mainly; Rarely spoke up, and ideas were off the mark.	/ 5
Total				/ 50

E   **Tutorial Plan** *(if applicable)*

F   **Laboratory Plan** *(if applicable)*

Project Topics for Data Science using R or any Data analytics tool:

Students should carry out projects that combine aspects of statistics, computer science, applied mathematics, and visualization for real-world problems. Analyse vast amounts of data, extract knowledge from them and generate reports/plots using R. The applications can be based on domains such as finance, social media, politics, networks, recommendation systems, crime analysis, sentiment analysis, medical, bioinformatics, geospatial etc.

Project topics for Security:

Students can use tools such as Cryptool, Wireshark, Nessus, Packet analyser, etc for implementation. Projects related to information security such as website vulnerability detection, online transaction fraud detection, phishing detection, digital watermarking, SQL injection prevention in websites, Authentication system using QR code, Detecting data leaks in e-commerce website, Developing hybrid techniques for data encryption.

Note: Apart from the above mentioned project topics if student groups come up with any innovative project ideas which are useful for the Department / College academic purpose will be considered based on the approval and acceptance from class teacher.

Sl. No	Week	Activity	Content deliverables by the assigned teacher
1	1st	Formation of groups. Note: Student groups of size 2 or 3 or 4	Introduction to system security, information security, network security.
2	2nd	Project topic selection by each group	Various encryption techniques implementation.
3	3rd	Presentation: Student and Project topic introduction by each group	Usage of existing libraries for various security features implementation
4	4th 5th and 6th	Front-end Design Layout of the project	Website vulnerabilities demonstration.
5	7th	Presentation on Front-end Design by each group	Usage of Crypstool and it's features.
6	8th and 9th	Back end design of the project with all the security features	Demonstration of encryption and decryption using Cryptool.
7	10th	Attacks possible on the application created	Demonstration of Wireshark tool.
8	11th	Complete Project Work Demonstration by each group	
9	12th	Project Report Preparation	

Sl. No	Week	Activity	Content deliverables by the assigned teacher
1	1st	Formation of groups. Note: Student groups of size 2 or 3 or 4	Introduction Data analytics using R
2	2nd	Project topic selection by each group	Introduction to Weka tool
3	3rd	Presentation: Student and Project topic introduction by each group with ER diagram	Introduction of Data analytics using python
4	4th 5th and 6th	Front-end Design Layout of the Forms	Sample code demonstration using R tool
5	7th	Presentation on Front-end Design by each group	Sample code demonstration using Weka tool
6	8th and 9th	Back end design of the project tables with schema diagram Design and Development of connecting among different web pages	Sample code demonstration using Python
7	10th	Presentation of Normalized tables with front-end back-end connectivity.	
8	11th	Complete Project Work Demonstration by each group	
9	12th	Project Report Preparation	

G   SEE Exam (50 Marks)

Evaluation of Projects carried out by students by External examiner along with internal faculty.

Academic Year	Aug-Dec 2020/Jan-May 2021		Sem.	6th
Course Title:	Seminar on Internship / MOOC course			
Course Code:	20CS6SRSTI			
L-T-P:	0-0-1		Total Credits:	1

A   Syllabus

Introduction: Technical Seminar Based on
Summer/Winter Internship (with any company the internship should be at least two weeks) during the vacation period of 4th and 5th Sem.). Internship should be based on Hands-on skills implementation related to Computer technology.

OR

Completion of any one MOOC (Massive Open online course) course through online platforms like NPTEL/SWAYAM /Coursera/Edx etc. (at least 2 weeks) based on Computer Science and Engineering related courses. MOOC should be registered and completed by students during the vacation period of 4thsem or 5th sem.

B   Course Outcomes

At the end of the course the student will be able to
Course Outcomes: INTERNSHIP

Sl. No.	Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	Ability to apply domain knowledge during the course of internship in the company.	3														
2	Ability to develop/implement the solutions with appropriate techniques, resources and contemporary tools.			3		3										
3	Ability to work independently and in a collaboration /multidisciplinary environment.							2		3						
4	Ability to allocate time effectively and manage to complete the work allotted within appropriate time											3				
5	Ability to demonstrate effective verbal and written communication skills										3					
6	Ability to exhibit integrity and ethical behaviour while carrying out the internship on site and for the preparation of report.								3							

C   **Assessment Plan (for 50 marks of CIE)**

Evaluation will be based on the rubrics set by the department under the committee of HOD, UG NBA coordinator, One professor, One Associate professor and One Assistant Professor.

Internship CIE Rubrics – 50 Marks

Criteria	Excellent	Good	Average	Poor
Ability to apply domain knowledge during the course of internship (10M)	Apply domain knowledge for design and development of all issues during the course of internship (10M)	Apply domain knowledge for design and development of most issues during the course of internship (7M)	Apply domain knowledge for design and development of specific issues during the course of internship (5M)	Unable to apply complete domain knowledge for design and development issues during the course of internship (2M)
Ability to develop / implement the solutions with appropriate techniques, resources and contemporary tools (10M)	Able to develop/implement all the solutions with appropriate techniques, resources and contemporary tools (10M)	Able to develop/implement most of the solutions with appropriate techniques, resources and contemporary tools (7M)	Able to develop/implement specific solutions with appropriate techniques, resources and contemporary tools (5M)	Not confident to develop/implement solutions with appropriate techniques, resources and contemporary tools (2M)
Ability to work independently and in collaboration / multidisciplinary environment. (10M)	Able to work independently and in a collaboration/multidisciplinary environment. (10M)	Able to work independently with minimal guidance and in a collaboration/multidisciplinary environment. (7M)	Able to work independently with more guidance and in a collaboration/multidisciplinary environment. (5M)	Unable to work independently without guide support and in a collaboration/multidisciplinary environment. (2M)
Ability to allocate time effectively and manage to complete the work allotted within appropriate time. (5M)	Able to allocate time effectively and complete all the work allotted within appropriate time. (5M)	Able to allocate time effectively and complete most of the work allotted within appropriate time. (4M)	Able to allocate time effectively and manage to complete the work allotted (3M)	Unable to use time effectively and complete the work allotted.(1M)
Ability to exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report. (5M)	Able to effectively exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report. (5M)	Able to moderately exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report. (4M)	Able to partially exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report. (3M)	Unable to exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report. (1M)
Ability to demonstrate effective oral and written communication skills (10M)	Able to demonstrate effective oral and written communication skills (10M)	Able to demonstrate oral and written communication skills moderately. (7M)	Able to demonstrate oral and written communication skills minimally. (5M)	Unable to demonstrate effective verbal and written communication skills (2M)

DEPARTMENT OF CSE

Course Outcomes for MOOC Completion Course

Sl. No.	Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	Ability to understand the basics and domain knowledge through videos, lecture notes, PPTs for the course registered during the course period.	3														
2	Ability to answer, solve , develop/implement the solutions with appropriate techniques, resources and contemporary tools			3		3										
3	Ability to allocate time effectively and manage to complete the work allotted and submit the assignment within the given deadline.											3				
4	Ability to demonstrate effective oral presentation and the preparation of course report.								3							

MOOC Course CIE Rubrics – 50 Marks

Criteria	Excellent	Good	Average	Poor
Ability to understand the basics and domain knowledge through videos, lecture notes, ppts for the course registered during the course period. (10M)	Ability to understand the All the basics and domain knowledge through videos, lecture notes, ppts during the course period (10M)	Ability to understand Most of the basics and domain knowledge through videos, lecture notes, ppts during the course period (7M)	Ability to understand few specific basics and domain knowledge through videos, lecture notes, ppts during the course period (5M)	Unable to understand the basics and domain knowledge through videos, lecture notes, ppts during the course period (2M)
Ability to answer, solve , develop/implement the solutions with appropriate techniques, resources and contemporary tools (10M)	Ability to answer, solve , develop/implement all the solutions with appropriate techniques, resources and contemporary tools (10M)	Ability to answer, solve , develop/implement Most of the solutions with appropriate techniques, resources and contemporary tools (7M)	Ability to answer, solve , develop/implement few specific solutions with appropriate techniques, resources and contemporary tools (5M)	Unable to answer, solve , develop/implement the solutions with appropriate techniques, resources and contemporary tools (2M)

Ability to allocate time effectively and manage to complete the work allotted and submit the assignment within the given deadline. (10M)	Ability to allocate time effectively and manage to complete All the work allotted and submit the assignment within the given deadline. (10M)	Ability to allocate time effectively and manage to complete Most of the work allotted and submit the assignment within the given deadline. (7M)	Ability to allocate time effectively and manage to complete Few of the specific work allotted and submit the assignment given within the given deadline. (5M)	Unable to allocate time effectively andnot able to complete the work allotted and submit the assignment given within the given deadline. (2M)
Ability to complete the registered course successfully with score >=90 (10M)	Ability to complete the registered course successfully with score >=90 (10M)	Ability to complete the registered course successfully with score >=(60-89) (7M)	Successfully Completed course with score 40 to 59 (5M)	No Certificate with score less than 40. (2M)
Ability to demonstrate effective oral presentation and the preparation of course report. (10M)	Ability to demonstrate effective oral presentation and the preparation of course report. (10M)	Ability to demonstrate effective oral presentation and the preparation of course report moderately. (7M)	Ability to demonstrate effective oral presentation and the preparation of course report minimally. (5M)	Unable to demonstrate effective oral presentation and the preparation of course report. (2M)

D   **SEE Exam (for 50 Marks)**

Internship/MOOC course presentation, evaluation will be carried out by External examiner along with Internal faculty.

Sem.	6th		
Course Title:	Personality Development and Communication Skills or Aptitude Skills		
Course Code:	20CS6NCNC6		
L-T-P:	0-0-0	Total Credits:	ZERO PASS/FAIL

A   Introduction

- Student should participate in any Personality Development & Communication (PDC) Skills Programme or any Aptitude test conducted by any organization, example GATE, GRE, TOFEL or any public sector exams conducted by ISRO, HAL or Defence.

- Student should submit participation certificate of PDC/Aptitude test for passing this mandatory course.

- Student should have participated in PDC skill training programme or appeared for Aptitude exam during the period from his/her 4th sem. vacation upto 6th sem. But should have completed training programme or should have appeared for aptitude test before the final evaluation of this non-credit mandatory course.

  Note: In case if student is unable to produce the certificate, then department head should take care of conducting aptitude Test or technical test with GATE questions.

B   Course Outcomes

CO1	Signifying his/her Communication skills.
CO2	Demonstrating individuality to engage in independent and life-long learning

C   CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3						
CO2												3			

D   Assessment Plan

Category	Marks (Range)	Personality Development and Communication Skills or Aptitude Skills
L1	90 (90-100)	-Participated in PDC training programmes conducted by national institute's such as IISC, IITs, IIITs or NITs OR -Passed the GATE, GRE, TOFEL or any public sector exams conducted by ISRO, HAL or Defence with good score
L2	80 (80-89)	-Participated in PDC training programmes conducted by any industry OR -Passed the GATE, GRE , TOFEL or any public sector exams conducted by ISRO, HAL or Defence with average score
L3	70 (70-79)	-Participated in PDC training programmes conducted by any private training institute OR -Passed the GATE, GRE, TOFEL or any public sector exams conducted by ISRO, HAL or Defence with passing score
L4	60 (60-69)	-Participated in PDC training programmes conducted by online course platforms such as Courseera, NPTEL, Edx, Udacity, etc. OR -Appeared for the GATE, GRE, TOFEL etc
L5	50 (50-59)	-Participated in PDC training programmes conducted by online private tutors. OR -Appeared for any public sector exams conducted by ISRO, HAL or Defence
L6	40 (40-49)	- Participated in PDC training programmes conducted by the college OR - Appeared for any aptitude exam conducted by private organization or by the department.

E   SEE Exam

Student should submit participation certificate of PDC or certificate of appearing to Aptitude test for passing this mandatory course.