BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

Academic Regulations & Syllabus
(w.e.f. 2020-2021)

4 Year B.Tech Program
of
Computer Science and Engineering

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

BAPATLA ENGINEERING COLLEGE :: BAPATLA
(AUTONOMOUS UNDER ACHARYA NAGARJUNA UNIVERSITY)
(SPONSORED BY BAPATLA EDUCATION SOCIETY)
BAPATLA - 522102 GUNTUR DISTRICT, A.P.
www.becbapatla.ac.in

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Course Structure Summary

S.No	Category	Credits	% of Credits
1	Humanities & Social Science including Management Courses	10.5	6.5
2	Basic Science Courses	18	11.5
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	22.5	14.0
4	Professional Core Courses	48	23.5
5	Professional Elective Courses	12	7.5
6	Job Oriented/Open Elective Courses	16.5	10.5
7	Project work, seminar, and internship in industry or elsewhere	16.5	16.5
8	Skill Oriented Courses	16	10.0
9	Mandatory Courses [Environmental Science, PEHV, Indian Constitution, Essence of Indian Traditional Knowledge etc]	-	-
Total		**160**	**100**

Semester Wise Credits Summary

Semester	Credits	With Honor Credits
Semester-I	16.5	16.5
Semester-II	22.5	22.5
Semester-III	21.5	21.5
Semester-IV	21.5	25.5
Semester-V	21.5	25.5
Semester-VI	21.5	25.5
Semester-VII	23	27
Semester-VIII	12	16
Total	**160**	**180**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
First Year B.Tech (SEMESTER – I) structure as per APSCHE
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS101/MA01	BS	Linear algebra and differential equations	2	1	0	3	30	70	100	3
20CS102/CY01	BS	Engineering Chemistry	3	0	0	3	30	70	100	3
20CS103/EL01	HS	Communicative English	3	0	0	3	30	70	100	3
20CSL101/MEL01	ES	Engineering Graphics	1	0	4	5	30	70	100	3
20CSL102/CYL01	BS	Chemistry Lab	0	0	3	3	30	70	100	1.5
20CSL103/ELL01	HS	English Communication skills Lab	0	0	3	3	30	70	100	1.5
20CSL104/MEL02	ES	Workshop Practice Lab	0	0	3	3	30	70	100	1.5
20CS104/MC01	MC	Environmental Studies	2	0	0	2	30	0	30	0
INDUCTION PROGRAM	First Three Weeks (Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Familiarization to Dept./Branch & Innovations)									
TOTAL			**11**	**1**	**13**	**25**	**240**	**490**	**730**	**16.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture, T: Tutorial, P: Practical
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MC: Mandatory course

1 Hr. Lecture (L) per week - 1 credit
1 Hr. Tutorial (T) per week - 1 credit
1 Hr. Practical (P) per week - 0.5 credits
2 Hours Practical (Lab)/week - 1 credit

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
First Year B.Tech (SEMESTER – II)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS201/MA02	BS	Numerical methods& Advanced Calculus	2	1	0	3	30	70	100	3
20CS202/PH03	BS	Semiconductor Physics	3	0	0	3	30	70	100	3
20CS203/EE01	ES	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100	3
20CS204/CS01	ES	Programming for Problem Solving	2	1	0	3	30	70	100	3
20CS205	ES	Digital Logic Design	3	0	0	3	30	70	100	3
20CS206	ES	Discrete Mathematics	3	0	0	3	30	70	100	3
20CSL201/PHL02	BS	Semiconductor Physics Lab	0	0	3	3	30	70	100	1.5
20CSL202/EEL01	ES	Basic Electrical & Electronics Engineering Lab	0	0	3	3	30	70	100	1.5
20CSL203/CSL01	ES	Programming for Problem Solving Lab	0	0	3	3	30	70	100	1.5
NCC/NSS			0	0	3	3				0
TOTAL			**16**	**2**	**12**	**30**	**270**	**630**	**900**	**22.5**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Second Year B.Tech (SEMESTER – III)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS301/MA03	BS	Probability & Statistics	2	1	0	3	30	70	100	3
20CS302	PC	Data Structures	2	1	0	3	30	70	100	3
20CS303	PC	Object Oriented Programming	2	1	0	3	30	70	100	3
20CS304	PC	Operating System	3	0	0	3	30	70	100	3
20CS305	PC	Computer Organization	3	0	0	3	30	70	100	3
20CSL301/SO01	SO	Linux Essentials	2	0	3	5	30	70	100	3.5
20CSL302	PC	Data Structures Lab	0	0	3	3	30	70	100	1.5
20CSL303	PC	Object Oriented Programming Lab	0	0	3	3	30	70	100	1.5
20CS306/MC02	MC	Professional Ethics & Human Values	2	0	0	2	30	0	30	0
TOTAL			**16**	**3**	**9**	**28**	**270**	**560**	**830**	**21.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Second Year B.Tech (SEMESTER – IV)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS401	ES	Microprocessor & Microcontrollers	3	0	0	3	30	70	100	3
20CS402	PC	Web Technologies	3	0	0	3	30	70	100	3
20CS403	PC	Database Management System	3	0	0	3	30	70	100	3
20CS404	PC	Design and Analysis of Algorithms	2	1	0	3	30	70	100	3
20CS405/EL02	HS	Technical English	3	0	0	3	30	70	100	3
20CSL401/SO02	SO	Python Programming	2	0	3	5	30	70	100	3.5
20CSL402	PC	Web Technologies Lab	0	0	3	3	30	70	100	1.5
20CSL403	PC	RDBMS Lab	0	0	3	3	30	70	100	1.5
TOTAL			**16**	**1**	**9**	**26**	**240**	**560**	**800**	**21.5**
20CSM4_/ 20CSH4_	**Honors/Minor Course (Pool 1)**		**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**19**	**2**	**9**	**30**	**270**	**630**	**900**	**25.5**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Third Year B.Tech (SEMESTER – V)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS501	PC	Automata Theory & Formal Languages	2	1	0	3	30	70	100	3
20CS502	PC	Computer Networks	3	0	0	3	30	70	100	3
20CS503	PC	Software Engineering	3	0	0	3	30	70	100	3
20CS504/PE_ _	PE	Professional Elective - 1	3	0	0	3	30	70	100	3
20CS505/JO_ _	JO	Job Oriented Elective - 1	3	0	0	3	30	70	100	3
20CSL501/SO03	SO	Soft Skills	1	0	2	3	30	70	100	2
20CSL502	PC	Software Engineering Lab	0	0	3	3	30	70	100	1.5
20CSL503	JO	Job Oriented Elective-1 Lab	0	0	3	3	30	70	100	1.5
20CSL504 /INT01	INT	Summer Internship	0	0	0	0	0	0	0	1.5
20CS506/MC03	MC	Essence of Indian Traditional Knowledge	2	0	0	2	30	0	30	0
TOTAL			**17**	**1**	**8**	**26**	**270**	**560**	**830**	**21.5**
20CSM5_/ 20CSH5_	**Honors/Minor Course (Pool 2)**		**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**20**	**2**	**8**	**30**	**300**	**630**	**930**	**25.5**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Third Year B.Tech (SEMESTER – VI)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS601	PC	Compiler Design	3	0	0	3	30	70	100	3
20CS602	PC	Machine Learning	2	1	0	3	30	70	100	3
20CS603	PC	Cryptography & Network Security	3	0	0	3	30	70	100	3
20CS604/PE_ _	PE	Professional Elective -2	3	0	0	3	30	70	100	3
20CS605/JO_ _	JO	Job Oriented Elective - 2	3	0	0	3	30	70	100	3
20CSL601/SO04	SO	Advanced Skill Oriented - 1	2	0	3	5	30	70	100	3.5
20CSL602	PC	Machine Learning Lab	0	0	3	3	30	70	100	1.5
20CSL603	JO	Job Oriented Elective -2 Lab	0	0	3	3	30	70	100	1.5
20CS606/MC04	MC	Constitution of India	2	0	0	2	30	0	30	0
TOTAL			**18**	**1**	**9**	**28**	**270**	**560**	**830**	**21.5**
20CSM6_/ 20CSH6_	**Honors/Minor Course (Pool 3)**		**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**21**	**2**	**9**	**32**	**300**	**630**	**930**	**25.5**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Fourth Year B.Tech (SEMESTER – VII)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS701/PE_ _	PE	Professional Elective - 3	3	0	0	3	30	70	100	3
20CS702/PE_ _	PE	Professional Elective – 4 (MOOCs)	-	-	-	-	-	-	-	3
20CS703/JO_ _	JO	Job Oriented Elective - 3	3	0	0	3	30	70	100	3
20CS704/OE_ _	OE	Open Elective	3	0	0	3	30	70	100	3
20CS705/ME05	HS	Industrial Management & Entrepreneurship Development	3	0	0	3	30	70	100	3
20CSL701/SO05	SO	Advanced Skill Oriented - 2	2	0	3	5	30	70	100	3.5
20CSL702	JO	Job Oriented Elective – 3 Lab	0	0	3	3	30	70	100	1.5
20CSL703/ INT02	INT	Industrial/ Research Internship	0	0	0	0	0	0	0	3
TOTAL			**14**	**0**	**6**	**20**	**180**	**420**	**600**	**23**
20CSM7_/ 20CSH7_	**Honors/Minor Course (Pool 4)**		**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**17**	**1**	**6**	**24**	**210**	**490**	**700**	**27**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science & Engineering
Fourth Year B.Tech (SEMESTER – VIII)
for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20CS801/PW01	PW	Project Work	0	0	0	0	50	100	150	12
20CSM8_/ 20CSH8_	**Honors/Minor Courses (MOOCs - 1)**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
20CSM8_/ 20CSH8_	**Honors/Minor Courses (MOOCs - 2)**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Grand Total			**0**	**0**	**0**	**0**	**50**	**100**	**150**	**16**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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List of Professional Electives:-

1. Wireless Networks
2. Data Warehousing & Data Mining
3. Distributed Systems
4. Artificial Intelligence
5. Digital Image Processing.
6. Block chain Technologies.
7. Protocols for Secure Electronic Commerce.
8. Artificial Neural Networks and Deep Learning.
9. Natural Language Processing.

List of Job Oriented Electives:-

1. Enterprise Programming.
2. Middleware Technologies.
3. Mobile Application Development.
4. Cloud Programming.
5. Statistics with R.
6. Cyber Security.
7. Internet of Things.
8. Big Data Analytics.
9. Software Testing Methodologies.

List of Advanced Skill Oriented Elective:-

1. Introduction to Computer Animation
2. Full Stack Development
3. DevOps
4. Robotic Process Automation
5. Introduction to Game Design

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List of Subjects offered under Honors in CSE

Note: - Students have to acquire 20 credits for the award of Honors in CSE.

i. 16 credits (04 courses@ 4 credits each) should be earned through the following list of courses.

ii. 4 credits (02 courses@ 2 credits each) must be acquired through two MOOCs from the following list of courses with a minimum duration of 8/12weeks.

iii. Before choosing those courses, students must complete prerequisites

HONORS POOL

A. Advanced Data Structures.
B. Advanced Computer Architecture.
C. Graph Theory
D. Numerical Optimization.
E. Advanced Database Systems
F. Real Time Operating Systems.
G. Parallel Algorithms.
H. Embedded Systems
I. Design Patterns.
J. Storage Area Networks
K. Computational Complexity.
L. Competitive Programming.
M. Web Semantics.
N. Spatial Informatics.
O. Perception & Computer Vision.
P. Virtual Reality

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List of Subjects offered under Minor in CSE

Students have to acquire 20 additional credits for the award of Minor in CSE.

I. 16 credits (04 courses@ 4 credits each) should be earned through the following pool.

II. 04 credits (02 courses@ 2 credits each) must be acquired by two courses of the following list, through the MOOCs/NPTEL with a minimum duration of 8/12weeks.

III. Before choosing the courses from Minor Pool, students must complete prerequisites.

MINOR POOL

A. Computer System Architecture.

B. Operating Systems.

C. Data Structures using C.

D. Object Oriented Programming using Java.

E. Discrete Mathematics.

F. Statistics with R

G. Design & Analysis of Algorithms.

H. Database Management Systems.

I. Software Engineering.

J. Computer Networks.

K. Web Application Programming.

L. Artificial Intelligence.

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LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS
I B.Tech – I Semester (Code: 20CS101/MA01)

Lectures	:	2 Hours/Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To learn about solving a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors.
CO-2	Identify the type of a given differential equation and select and apply the appropriate Analytical technique for finding the solution of first order and higher order ordinary differential equations.
CO-3	Create and analyze mathematical models using first and second order differential equations to solve application problems that arises in engineering.
CO-4	To learn about solving linear Differential equations with constant coefficients with the given initial conditions using Laplace transform technique.

Course Learning Outcomes: Students will be able to

CLO-1	Solve a system of linear simultaneous equations, finding the inverse of a given matrix and also its Eigen values and Eigen vectors.
CLO-2	Apply the appropriate analytical technique for finding the solution of a first order ordinary differential equation and use these techniques to solve some real life problems.
CLO-3	Solve higher order linear differential equations with constant coefficients and apply them to solve the circuit problems
CLO-4	Evaluate Laplace transform of a given function and apply Laplace transform techniques to solve linear differential equations with constant coefficients.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO-2	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO-3	3	2	-	1	-	-	-	-	-	-	-	-	3	-	-
CLO-4	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-

UNIT-1 (12 Hours)

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse;

Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values (without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

UNIT-2	(12 Hours)
Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations. **Equations reducible to Exact equations:** I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0. **Applications of a first order Differential equations:** Newton's law of cooling; Rate of decay of Radio-active materials. [Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]	
UNIT-3	(12 Hours)
Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; **Applications of Linear Differential Equations:** Oscillatory Electrical Circuits. [Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5]	
UNIT-4	(12 Hours)
Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); **Application to differential equations**: Solution of ODE with constant coefficients using Laplace transforms. [Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]	
Text Books :	B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.
References :	1. ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. 2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

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ENGINEERING CHEMISTRY
I B. Tech. – II Semester (Code: 20CS102/CY01)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.
CO-2	To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.
CO-3	With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics
CO-4	With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

Course Learning Outcomes: Students will be able to

CLO-1	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
CLO-2	Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.
CLO-3	Have the capacity of applying energy sources efficiently and economically for various needs.
CLO-4	Design economically and new methods of organic synthesis and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	1	-	-	2	3	-	-	-	-	3	3	-	-
CLO-2	3	3	2	-	-	2	2	-	-	-	-	3	3	3	2
CLO-3	3	3	-	-	-	2	3	-	-	-	-	3	3	3	2
CLO-4	3	3	2	-	-	2	1	-	-	-	-	2	2	-	-

UNIT-1 (12 Hours)

Introduction: water quality parameters
Characteristics: Alkalinity, Hardness **-** Estimation & simple numerical problems,
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;
Internal conditioning- phosphate, calgon and carbonate methods.
External conditioning - Ion exchange process & Zeolite process WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration.
Disinfection methods: Chlorination, ozonization and UV treatment.
Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT-2 (12 Hours)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.

Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion, **Corrosion control** – Cathodic protection, and electro plating (Au) & electrodes Ni plating.

UNIT-3	(12 Hours)

Fuels: Classification of fuels; Calorific value of fuels (lower, higher)

Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking.

Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti-knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages

Gaseous fuels: CNG and LPG,

Flue gas analysis – Orsat apparatus.

UNIT-4	(12 Hours)

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markwnikoff's rules) , elimination (E_1& E_2), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)

Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications**.** Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC.

Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co-β-hydroxyvalerate (PHBV), applications.

Text Books :	1. P.C. Jain and Monica Jain, "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi 17th edition (2017). 2. SeshiChawla, "Engineering Chemistry" DhanpatRai Pub, Co LTD, New Delhi 13 th edition, 2013.
References :	1. Essential of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012. 2. Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006). 3. Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

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COMMUNICATIVE ENGLISH
I B. Tech. – I Semester (Code: 20CS103/EL01)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To comprehend the importance, barriers and strategies of listening skills in English.
CO-2	To illustrate and impart practice Phonemic symbols, stress and intonation.
CO-3	To practice oral skills and receive feedback on learners' performance.
CO-4	To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Course Learning Outcomes: Students will be able to

CLO-1	Understand basic grammatical units and their usage;
CLO-2	Learn to think, Write critically and coherently;
CLO-3	Recognize writings as a process rather than a product;
CLO-4	Upgrading comprehension skills of English Material of various types; and Enhancing range of vocabulary to communicate in varied contexts.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1
CLO-2	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1
CLO-3	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	**1**
CLO-4	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1

UNIT-1 (12 Hours)

1.**1 Vocabulary Development:** Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes
1.2 **Essential Grammar:** Prepositions, Conjunctions, Articles
1.3 **Basic Writing Skills:** Punctuation in writing
1.4 **Writing Practices:** Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-2 (12 Hours)

2.**1 Vocabulary Development:** Synonyms and Antonyms
2.2 **Essential Grammar:** Concord, Modal Verbs, Common Errors
2.3 **Basic Writing Skills**: Using Phrases and clauses
2.4 **Writing Practices**: Hint Development, Essay Writing

UNIT-3 (12 Hours)

3.1 **Vocabulary Development:** One word Substitutes
3.2 **Essential Grammar:**Tenses, Voices

3.**3 Basic Writing Skills:** Sentence structures (Simple, Complex, Compound) 3.4 **Writing Practices:** Note Making	
UNIT-4	(12 Hours)
4.1 **Vocabulary Development**: Words often confused 4.2 **Essential Grammar**: Reported speech, Common Errors 4.3 **Basic Writing Skills**: Coherence in Writing: Jumbled Sentences **Writing Practices**: Paraphrasing &Summarizing	
Text Books :	1. Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press:2011. 2. Practical English Usage, Michael Swan. Oxford University Press:1995. 3. Remedial English Grammar, F.T.Wood. Macmillan:2007. 4. Study Writing, Liz Hamplyons & Ben Heasley. Cambridge University Press:2006

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ENGINEERING GRAPHICS

I B. Tech. – II Semester (Code: 20CSL101/MEL01)

Practicles	:	4 Hour/Week, 1 Hour Theory	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	clear picture about the importance of engineering graphics in the field of engineering
CO-2	the drawing skills and impart students to follow Bureau of Indian Standards
CO-3	To give an idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections
CO-4	imagination skills about orientation of points, lines, surfaces and solids
CO-5	basic drafting skills of Auto CAD

Course Learning Outcomes: Students will be able to

CLO-1	draw projections of points and projections of lines using Auto CAD
CLO-2	plot projections of surfaces like circle, square and rhombus
CLO-3	plot the Projections of solids like Prisms and pyramids
CLO-4	convert the of Orthographic views into isometric views of simple objects
CLO-5	generate the of pictorial views into orthographic views of simple castings

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CLO-2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CLO-5	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-

UNIT-1 (16 Hours)

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures

INTRODUCTION TO AUTOCAD:

Basics of sheet selection, Draw tools, Modify tools, dimensioning

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

UNIT-2 (16 Hours)

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT-3 (16 Hours)

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones Inclined to one plane

UNIT-4	(16 Hours)
ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).	
UNIT-5	(16 Hours)
ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).	
Text Books :	1. Engineering Drawing with AutoCAD by Dhananjay M. Kulkarni (PHI publication) 2. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)
References :	1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers 2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

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ENGINEERING CHEMISTRY LAB
I B.Tech – II Semester (Code: 20CSL102/CYL01)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.
CO-2	To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.
CO-3	With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics
CO-4	With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

Course Learning Outcomes: Students will be able to

CLO-1	Develop innovative methods to produce soft water for industrial use and able to solve the industrial problems
CLO-2	the students will be familiar with applications of polymers in domestic and engineering areas & the most recent surface characterization techniques
CLO-3	Have the capacity of classifying fuels, their calorific value determination and applying energy sources efficiently and economically for various needs.
CLO-4	Explain features, classification, applications of newer class materials like smart materials, refrocteries, abbrasives, lubriants and composite materials etc.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	-	-	-	-	-	-	-	3	2	-	-	2	-	-
CLO-2	2	2	2	2	-	2	-	-	3	2	-	1	-	-	-
CLO-3	2	2	2	2	-	2	-	-	3	2	-	1	1	-	-
CLO-4	2	2	2	2	-	-	-	-	3	2	-	1	-	-	-

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).

2. **Volumetric Analysis:**
   a. Estimation of Washing Soda.
   b. Estimation of Active Chlorine Content in Bleaching Powder
   c. Estimation of Mohr's salt by permanganometry.
   b. Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. **Analysis of Water**: a. Determination of Alkalinity of Tap water. b. Determination of Total Hardness of ground water sample by EDTA method c. Determination of Salinity of water sample. 4. **Estimation of properties of oil:** a. Estimation of Acid Value b. Estimation of Saponification value. 5. **Preparations:** a. Preparation of Soap b. Preparation of Urea-formaldehyde resin c. Preparation of Phenyl benzoate.	
Text Books :	1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009. 2. Inorganic quantitative analysis, Vogel, 5th edition, Longman group Ltd. London, 1979.
References :	1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel. 2. A text book on experiments and calculations- Engineering Chemistry. S.S. Dara. 3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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ENGLISH COMMUNICATION SKILLS LAB
I B. Tech. – I Semester (Code: 20DSL103/ELL01)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To comprehend the importance, barriers and strategies of listening skills in English.
CO-2	To illustrate and impart practice Phonemic symbols, stress and intonation.
CO-3	To practice oral skills and receive feedback on learners' performance.
CO-4	To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Course Learning Outcomes: Students will be able to

CLO-1	Learn to research and critically analyze issues to write critically and coherently;
CLO-2	Communicate pleasantly in kinds of Interpersonal Interactions;
CLO-3	Understand dynamics of Telephone Conversations through practice; and
CLO-4	Become familiar with the Pronunciation rules and application

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1
CLO-2	-	-	-	-	-	-	-	-	2	3	2	2	2	1	1
CLO-3	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1
CLO-4	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1

1.1 Listening Skills; Importance – Purpose- Process- Types
1.2 Barriers to Listening
1.3 Strategies for Effective Listening

2.1 Phonetics; Introduction to Consonant, Vowel and Diphthong sounds
2.2 Stress
2.3 Rhythm
2.4 Intonation

3.1Formal and Informal Situations
3.2 Expressions used in different situations
3.3 Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions & Advices-Expressing Opinions-Inviting People-Requesting-Seeking Permission-Giving Information- Giving Directions- Sympathizing- Convincing People- Complaining & Apologizing-Thanking Others- Shopping- Travelling- Conversational Gambits

4.1 JAM Session 4.2 Debates 4.3 Extempore	
Text Books :	1. Communication Skills, Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011 2. Better English Pronunciation, J.D. O' Connor. Cambridge University Press:1984 3. New Interchange (4rth Edition), Jack C Richards. Cambridge University Press:2015 4. English Conversation Practice, Grant Taylor. McGraw Hill:2001
Software:	1. Buzzers for conversations, New Interchange series 2. English in Mind series, Telephoning in English 3. Speech Solutions, A Course in Listening and Speaking

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WORKSHOP PRACTICE

I B. Tech. – II Semester (Code: 20CSL104/MEL02)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To impart student knowledge on various hand tools for usage in engineering applications.
CO-2	Be able to use analytical skills for the production of components.
CO-3	Design and model different prototypes using carpentry, sheet metal and welding.
CO-4	Electrical connections for daily applications.
CO-5	To make student aware of safety rules in working environments.

Course Learning Outcomes: Students will be able to

CLO-1	Make half lap joint, Dovetail joint and Mortise &Tenon joint
CLO-2	Produce Lap joint, Tee joint and Butt joint using Gas welding
CLO-3	Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools
CLO-4	Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	3	2	-	2	-	2	-	-	1	-	2	1	2	3
CLO-2	2	3	2	-	2	-	2	-	-	1	-	2	1	2	3
CLO-3	2	3	2	-	2	-	2	-	-	1	-	1	1	2	3
CLO-4	-	-	2	-	2	-	2	-	-	1	-	1	-	-	2

LIST OF EXPERIMENTS

1. Carpentry
   a. Half Lap joint
   b. Dovetail joint
   c. Mortise &Tenon joint
2. Welding using electric arc welding process/gas welding
   a. Lap joint
   b. Tee joint
   c. Butt joint
3. Sheet metal operations with hand tools
   a. Trapezoidal tray
   b. Funnel
   c. T-joint
2. House wiring
   a. To control one lamp by a single switch
   b. To control two lamps by a single switch
   c. Stair-case wiring

Text Books :	1. P.Kannaiah and K.L.Narayana, Workshop Manual, SciTech Publishers, 2009. 2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008

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ENVIRONMENTAL STUDIES
I B. Tech. – I Semester (Code: 20CS104/MC01)

Lectures	:	2 Hours/Week	Continuous Assessment	:	30
Final Exam	:		Final Exam Marks	:	

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To develop an awareness, knowledge, and appreciation for the natural environment.
CO-2	To understand different types of ecosystems exist in nature.
CO-3	To know our biodiversity.
CO-4	To understand different types of pollutants present in Environment.
CO-5	Create awareness among the youth on environmental concerns important in the long-term interest of the society

Course Learning Outcomes: Students will be able to

CLO-1	Develop an appreciation for the local and natural history of the area.
CLO-2	Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.
CLO-3	Know how to manage the harmful pollutants.
CLO-4	Gain the knowledge of Environment.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	1	-	2	3	-	-	1	-	2	-	-	-
CLO-2	-	-	-	-	2	2	3	-	-	1	-	2	-	-	1
CLO-3	-	-	-	-	-	-	3	-	-	1	1	2	1	-	-
CLO-4	-	-	-	1	-	2	3	-	-	1	-	2	1	-	-

UNIT-1 (8 Hours)

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries).

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT-2 (8 Hours)

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. **Forest**: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. **Water**: Uses, floods and drought, Dams - benefits and problems.
Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada BachaoAndolan case studies
Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.

UNIT-3	(8 Hours)

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting.
Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act.

UNIT-4	(8 Hours)

Environmental issues: Green House effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment. Environmental Standards (ISO 14000, etc.)
Case Studies: Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare).
Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.

Text Books :	1. "Environmental Studies" by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi. 2. "Comprehensive environmental studies"- JP Sharma, Laxmi Publications. 3. Text Book of environmental Studies – ErachBharucha
References :	1. "Environmental studies", R.Rajagopalan, Oxford University Press. 2. "Introduction to Environmental Science", Anjaneyulu Y, B S Publications 3. "Environmental Science", 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

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NUMERICAL METHODS AND ADVANCED CALCULUS
I B. Tech. – II Semester (Code: 20CS201/MA02)

Lectures	:	2 Hours/Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To learn about some advanced numerical techniques e.g. solving a non-linear equation
CO-2	linear system of equations, Interpolation and Approximation techniques
CO-3	To learn about evaluation of double and triple integrals and their applications
CO-4	To learn some basic properties of scalar and vector point functions and their applications to line, surface and volume integrals.

Course Learning Outcomes: Students will be able to

CLO-1	Solve non-linear equations in one variable and system of linear equations using iteration methods.
CLO-2	Choose appropriate interpolation formulae based on the given data. Compute the value of a definite integral using numerical integration techniques.
CLO-4	Predict the numerical solution of the derivative at a point from the given initial value.
CLO-5	Problem using appropriate numerical method the Evaluate double and triple integrals using change of variables. Transform line integrals to surface and surface to volume integrals and evaluate them.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO-2	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO-3	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO-4	3	3	-	1	-	-	-	-	-	-	-	-	3	-	-

UNIT-1 (12 Hours)

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi's iterative method, Gauss-Seidel iterative method.

[Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2].

UNIT-2 (12 Hours)

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton's interpolation formulae: Newton's forward interpolation formula, Newton's backward interpolation formula; Interpolation with unequal intervals; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical integration; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Numerical solution of

ODE's: Introduction; Picard's method; Euler's method; Runge-Kutta method. [Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7].	
UNIT-3	(12 Hours)
Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integrals, Change of variables. [Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2; 7.7.2].	
UNIT-4	(12 Hours)
Vector calculus and its Applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem (without proof). [Sections: 8.4; 8.5.1; 8.5.3; 8.6; 8.11; 8.12; 8.13; 8.14; 8.16]	
Text Books :	1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.
References :	1. ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. 2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

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SEMICONDUCTOR PHYSICS

I B. Tech. - I semester (Code: 20CS202/PH03)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None

Course Objectives: Students will be able to

CO-1	This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principles regarding electrical conduction.
CO-2	This unit provides various properties of semiconductor materials and their importance in various device fabrications
CO-3	This unit aim to educate the student on various opto-electronic devices and their applications.
CO-4	This unit provide information about the principles of processing, manufacturing and characterization of nano materials, nanostructures and their applications

Course Learning Outcomes: Students will be able to

CLO-1	Understand concepts of band structure of solids, concept of hole and effective mass of electron in semiconductors.
CLO-2	Know the concept of Fermi level and various semiconductor junctions.
CLO-3	Familiar with working principles of various opto-electronic devices and their applications.
CLO-4	Understand importance of nano-materials and their characteristic properties.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CLO-2	3	1	2	2	-	-	-	-	-	-	-	-	-	-	-
CLO-3	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CLO-4	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-

UNIT-1 (12 Hours)

ELECTRONIC MATERIALS:

Somerfield free electron theory, Fermi level and energy, density of states, Failure of free electron theory (Qualitative), Energy bands in solids, E-K diagrams, Direct and Indirect band gaps. Types of Electronic materials: Metals, Semi conductors and Insulators, Occupation Probability, effective mass, Concept of hole

UNIT-2 (12 Hours)

SEMICONDUCTORS:
Introduction to semiconductors, intrinsic and extrinsic semiconductors, carrier concentrations, Fermi level and temperature dependence, Continuity equation, Diffusion and drift, P-N junction (V-I characteristics), Metal – Semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for opto- electronic devices.

UNIT-3	(12 Hours)

OPTO-ELECTRONIC DEVICES AND DISPLAY DEVICES:
Photo voltaic effect, principle and working of LED, Applications of Photo diode, Solar cell, PIN & APD Diode, Liquid crystal display, Opto electric effect: Faraday Effect and Kerr effect.

UNIT-4	(12 Hours)

NANO-MATERIALS:
Introduction to nano technology, quantum confinement, surface to volume ratio, properties of nano materials, synthesis of nano-materials: CVD, sol-gel methods, laser ablation.
Carbon nano tubes: types, properties, applications. Characterization of nano materials: XRD, SEM, applications of nano materials.

Text Books :	1. A text book of engineering physics by Avadhanulu and KshirsagarS.Chand& Co. (2013) 2. Applied physics by Dr.*P.SrinivasaRao*. Dr.K.*Muralidhar* 3. Introduction to solid state state physics, Charles Kittel, 8th edition 4. Solid state physics, S.O. Pillai
References :	1. Text book on Nanoscience and Nanotechnology (2013): B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, Springer Science & Business Media. 2. Basic Engineering Physics ,Dr.*P.SrinivasaRao*. Dr.K.*Muralidhar.* Himalaya Publications, 2016

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
I B. Tech. – I Semester (Code: 20CS203/EE01)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To understand basic Laws in circuits, analysis of simple DC circuits, Theorems and its applications, fundamentals of AC circuits & its analysis and concepts of three phase balanced circuits
CO-2	To learn basic properties of magnetic materials and its applications.
CO-3	To understand working principle, construction, applications and performance of DC machines, AC machines.
CO-4	To learn basic concepts, working principal, characteristics and applications of semiconductor diode and transistor family.
CO-5	To gain knowledge about the static converters and regulators.
CO-6	To learn basic concepts of power transistors and operational amplifiers closer to practical applications.

Course Learning Outcomes: Students will be able to

CLO-1	Solve problems involving with DC and AC excitation sources in electrical circuits.
CLO-2	Compare properties of magnetic materials and its applications
CLO-3	Analyze construction, principle of operation, application and performance of DC machines and AC machines.
CLO-4	Explore characteristics and applications of semiconductor diode and transistion family.
CLO-5	Make the static converters and regulators
CLO-6	Analyze concepts of power transistors and operational amplifiers closer to practical applications

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	-	-	2	2	-	-	-	-	-	-	-	3	2	-
CLO-2	3	2	-	1	-	-	-	-	-	-	-	-	3	3	-
CLO-3	3	3	-	2	1	-	-	-	-	-	-	-	3	2	-
CLO-4	3	2	2	-	-	-	-	-	-	-	-	-	2	1	-
CLO-5	2	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CLO-6	2	1	-	2	-	-	-	-	-	-	-	-	2	3	-

UNIT-1 (12 Hours)

Electrical Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin and Norton Theorems. Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-2 (12 Hours)

Electrical Machines

Magnetic materials, BH characteristics, Construction, working of DC machines, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor.Single-phase induction motor.Construction and working of synchronous generators.

UNIT-3	(12 Hours)

Semiconductor Diodes and applications

Semiconductor materials, semiconductor diode, Resistance levels, Diode equivalent circuits, Zener diode, Light emitting diode, Load line analysis, half wave rectification, Full wave rectification, Bridge rectifier, Use of capacitor filter in rectifier, Zener diode voltage regulator, Clippers, Clampers

Bipolar Junction Transistors

Transistor construction and operation, Common base configuration, Transistor amplifying action, Common emitter configuration, Common collector configuration, Limits of operation. DC load line and bias point, Voltage divider bias of transistor.

UNIT-4	(12 Hours)

Field Effect Transistors

Construction and characteristics of JFET and MOSFET

Operational Amplifiers

Introduction, Differential and common mode operation, OP-AMP Basics, Practical OP-AMP circuits: Inverting amplifier, Non inverting amplifier, Unity follower, summing amplifier, Integrator and differentiator

Text Books :	1. S.K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Publications 2. Robert L. Boylestad& Louis Nashelsky, ' Electronic Devices and circuit theory', PHI Pvt.Limited, 11th edition 3. "Basics of Electrical and Electronics Engineering", Nagsarkar T K and Sukhija M S, Oxford press University Press.
References :	1. David A. Bell, 'Electronic Devices and Circuits', oxford publisher,5th edition 2. "Basic Electrical, Electronics and Computer Engineering", Muthusubramanian R, Salivahanan S and Muraleedharan K A, Tata McGraw Hill, Second Edition, (2006).

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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PROBLEM SOLVING USING PROGRAMMING

I B.Tech – II Semester (Code: 20CS204/CS01)

Lectures	:	3 Hours/Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite:

Course Objectives: Students will be able to

CO-1	Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, Arithmetic rules.
CO-2	Develop problem-solving skills to translate "English" described problems into Programs written using C language.
CO-3	Use Conditional Branching, Looping, and Functions.
CO-4	Apply pointers for parameter passing, referencing and differencing and linking data structures.
CO-5	Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Learning Outcomes: Students will be able to

CLO-1	Choose and Analyze the right data representation formats and algorithms to solve the problem.
CLO-2	Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
CLO-3	Write the program on a computer, edit, compile, debug, correct, recompile and run it.
CLO-4	Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	2	-	-	-	-	-	-	-	-	-	-	3	2
CLO-2	2	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CLO-3	2	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CLO-4	2	1	2	-	-	-	-	-	-	-	-	-	-	2	1

UNIT-1 (12 Hours)

Overview of C, Constants, Variables and Data Types, Operators and Expressions, Managing I/O Operations. Decision Making and Branching.

Programming Exercises for Unit I: C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with

the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its uppercase.	
UNIT-2	(12 Hours)
Decision Making and Looping, Arrays, Character Arrays and Strings. **Programming Exercises for UnitII:** To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number. To print graphic patterns of symbols and numbers. To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.	
UNIT-3	(12 Hours)
User-defined Functions, Structures and Unions, Pointers **Programming Exercises for Unit -III:** Functions-Recursive functions to find factorial & GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using array of pointers.	
UNIT-4	(12 Hours)
File Management in C, Dynamic Memory Allocation, Preprocessor **Programming Exercises for Unit - IV**: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments. Copy the contents of one file to another file. Allocating memory to variables dynamically.	
TextBooks :	1. "Programming in ANSIC" by E. Balaguruswamy, Fifth Edition, McGraw Hill Education India. 2. "Let us C" by Yashavant P.Kanetkar, 14th Edition, BPB Publications.
References:	1. Kernighan BW and Dennis Ritchie M, "C programming language", 2nd edition, Prentice Hall. 2. HerbertSchildt,"C:TheCompleteReference",4thedition,TataMcgraw-Hill. 3. AshokN.Kamthane,"ProgramminginC",PEARSON2ndEdition. 4. ReemaThareja, "Programming in C", Oxford University Press, 2nd Edition, 2015

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DIGITAL LOGIC DESIGN
I B.Tech – II Semester (Code: 20CS205)

Lectures	:	3 Hours /Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Basic Computer Knowledge.

Course Objectives: Students will be able to

CO-1	Understand of the fundamental concepts and techniques used in digital electronics, and Number conversions.
CO-2	Understand basic arithmetic operations in different number systems and simplification of Boolean functions using Boolean algebra and K-Maps.
CO-3	Simplify the Boolean functions using Tabulation method, Concepts of combinational logic circuits.
CO-4	Understand the concepts of Flip-Flops, Analysis of sequential circuits
CO-5	Understand the concepts of Registers, Counters and classification of Memory units.

Course Learning Outcomes: Students will be able to

CLO-1	Understand basic arithmetic operations in different number systems and simplification of Boolean functions using Boolean algebra and K-Maps.
CLO-2	Simplify Boolean functions using Tabulation method, Concepts of combinational logic circuits.
CLO-3	Understand the concepts of Flip-Flops, Analysis of sequential circuits.
CLO-4	Understand the concepts of Registers, Counters and classification of Memory units.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	-	3	2	-	-	-	-	-	-	-	-	2	1
CLO-2	2	2	-	2	2	-	-	-	-	-	-	-	2	2	2
CLO-3	1	3	2	-	-	-	2	-	-	-	-	-	2	-	2
CLO-4	1	2	1	-	-	-	2	-	-	-	-	-	1	-	2

UNIT-1 (12 Hours)

DIGITAL SYSTEMS AND BINARY NUMBERS: Digital System, Binary Numbers, Number base Conversions, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic, Error Detection and Correction: 7 bit Hamming Code.

BOOLEAN ALGEBRA & LOGIC GATES: Introduction, Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Boolean functions, Canonical and Standard Forms, Other Logic Operations, Digital logic gates.

GATE –LEVEL MINIMIZATION: Introduction, The map method, Four-variable K-Map, Product-of-Sums Simplification, Don't –Care Conditions, NAND and NOR implementation, Other Two level Implementations.

UNIT-2 (12 Hours)

MINIMIZATION: The Tabulation method, Determination of prime implicants, Selection of prime-implicants. **COMBINATIONAL LOGIC:** Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adders - Subtractor, Decimal Adder, Magnitude Comparator, Decoders, Encoders, Multiplexers.	
UNIT-3	(12 Hours)
SYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Sequential Circuits, Storage Elements - Latches, Storage Elements -Flip Flops, Analysis of Clocked Sequential Circuits: State Equations, State Table, State Diagram, Flip Flop Input Equations, Analysis with D, JK and T Flip Flops; State reduction and Assignment, Design Procedure.	
UNIT-4	(12 Hours)
REGISTERS and COUNTERS: Registers, Shift registers, Ripple Counters, Synchronous Counters. **MEMORY and PROGRAMMABLE LOGIC:** Introduction, Random Access Memory: Read and Write Operations, Types of Memories; Read Only Memory, Programmable Logic Devices: PROM, PLA, PAL.	
Text Books :	1. M. Morris Mano, Michael D. Ciletti, "Digital Design", 5th Edition,PrenticeHall, 2013. 2. A. Anand Kumar, "fundamentals of digital circuits", 4th Edition, PHI.
References :	3. John F. Wakerly, "Digital Design: Principles and Practices", 4th Edition, Pearson, 2006. 4. Brian Holdsworth , Clive Woods, "Digital Logic Design", 4th Edition, Elsevier Publisher, 2002. 5. Donald E Givone, "digital principles and design", TMT.

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DISCRETE MATHEMATICS
I B.Tech – II Semester(Code: 20CS206)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Understand operations on discrete structures such as sets, functions, and relations. Formulate short proofs using methods of proof of an implication. Verify the correctness of an argument using propositional logic and truth tables. Construct mathematical arguments using logical connectives and quantifiers.
CO-2	Verify the correctness of an argument using rules of inference for quantified propositions. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory. Understand counting and indirect counting techniques and combinatory in the context of discrete probability.
CO-3	Understand sequences, generating functions, and recurrence relations. Understand and compute coefficients for generating functions. Understand and solve homogeneous recurrence relations.
CO-4	Understand and solve Inhomogeneous recurrence relations. Understand the properties of binary relations, partial orderings and lattices. Construct graphs and adjacency matrices for binary relations.

Course Learning Outcomes: Students will be able to

CLO-1	Understand the basic principles of sets, relations and functions. Illustrate inference rules for validating arguments.
CLO-2	Prove that the given statement is valid by using mathematical induction. Solve computational problems by using various counting techniques.
CLO-3	Build generating functions for sequences. Compute coefficients for generating functions. Solve homogeneous recurrence relations using various methods.
CLO-4	Solve Inhomogeneous recurrence relations. Construct hasse diagrams for posets. Find out the transitive closure of a given relation.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	POs												PSOs		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	-	-	-	-	-	1	-	-	-	2	3	3	1
CLO-2	3	2	-	-	-	-	-	1	-	-	-	2	3	3	1
CLO-3	3	2	-	-	-	-	-	1	-	-	-	1	2	3	1
CLO-4	3	2	-	-	-	-	-	1	-	-	-	3	2	3	1

UNIT-1 (15 Hours)

Foundations: Sets, Relations and Functions, Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First order Logic & Other methods of proof.

UNIT-2 (15 Hours)

Rules of Inference for Quantified propositions, Mathematical Induction.

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations

with repetitions, Enumerating Permutation with Constrained repetitions..	
UNIT-3	(15 Hours)
Recurrence relations: Generating functions of sequences, Calculating Coefficients of Generating Functions **Recurrence Relations:** Solving recurrence relations by Substitution and generating functions, The methods of characteristic roots.	
UNIT-4	(15 Hours)
Recurrence Relations: solutions of Inhomogeneous recurrence relations. **Relations:** Special properties of binary relations, Operations on relation. Ordering relations, Lattice, Paths and Closures, Directed Graphs and Adjacency Matrices.	
Text Books :	Toe L.Mott, Abraham Kandel &TheodoreP.Baker, "Discrete Mathematics Computer Scientists & Mathematicians", PHI 2nd edition, 2012.
References :	1. C.L. Liu, "Elements of Discrete Mathematics", McGraw-Hill Education, 2nd edition. 2. Rosen, "Discrete Mathematics". ", McGraw-Hill Education, 8th edition.

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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SEMICONDUCTOR PHYSICS LAB

I B.Tech – I Semester (Code: 20CSL201/PHL02)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principles regarding electrical conduction.
CO-2	This unit provides various properties of semiconductor materials and their importance in various device fabrications
CO-3	This unit aim to educate the student on various opto-electronic devices and their applications.
CO-4	This unit provide information about the principles of processing, manufacturing and characterization of nano materials, nano structures and their applications

Course Learning Outcomes: Students will be able to

CLO-1	Acknowledge the important aspects of earth magnetic field, realize the use of Maxwells equations in various magnetic applications
CLO-2	Applications of basic principles of optics to estimate physical parameters.
CLO-3	Realization of material properties and parameters.
CLO-4	Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CLO-2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4	2	2	3	-	1	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil usingStewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands
4. Determination of radius of curvature of a Plano convex lens by forming Newton's rings..
5. Determination of wavelengths of mercury spectrum using grating normal incidencemethod.
6. Determination of dispersive power of a given material of prism using prism minimumdeviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonantfrequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.

9. Verify the laws of transverse vibration of stretched string using sonometer. 10. Determine the rigidity modulus of the given material of the wire using Torsionalpendulum. 11. Draw the load characteristic curves of a solar cell. 12. Determination of Hall coefficient of a semiconductor. 13. Determination of voltage and frequency of an A.C. signal using C.R.O. 14. Determination of Forbidden energy gap of Si &Ge. 15. Determination of wavelength of laser source using Diode laser. **Any three experiments are virtual**	
Text Books :	1. Engineering physics laboratorymanualP.Srinivasarao & K.Muraldhar, Himalaya publications.

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
I B.Tech – I Semester (Code: 20CSL202/EEL01)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	To understand basic Laws in circuits, analysis of simple DC circuits, Theorems and its applications, fundamentals of AC circuits & its analysis and concepts of three phase balanced circuits
CO-2	To learn basic properties of magnetic materials and its applications.
CO-3	To understand working principle, construction, applications and performance of DC machines, AC machines.
CO-4	To learn basic concepts, working principal, characteristics and applications of semiconductor diode and transistor family.
CO-5	To gain knowledge about the static converters and regulators.
CO-6	To learn basic concepts of power transistors and operational amplifiers closer to practical applications.

Course Learning Outcomes: Students will be able to

CLO-1	Solve Problems involving with DC and AC excitation sources in electrical circuits
CLO-2	Compare properties of magnetic materials and its applications
CLO-3	Analyze construction, principle of operation, application and performance of DC machines and AC machines
CLO-4	Explore characteristics and applications of semi conductor diode and transistor family
CLO-5	Make the static converts and regulators

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-
CLO-2	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CLO-3	3	3	2	1	-	-	-	-	-	-	-	-	3	2	-
CLO-4	3	3	1	2	-	-	-	-	-	-	-	-	3	2	-
CLO-5	3	2	3	3	-	-	-	-	-	-	-	-	3	3	-

LIST OF EXPERIMENTS

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Parameters of choke coil
6. Measurement of low and medium resistance using volt ampere method
7. OC & SC test of single phase transformer
8. Load test on single phase transformer
9. V-I characteristics of PN junction Diode
10. V-I characteristics of Zener Diode
11. Characteristics of CE Configuration

12. Transfer and Drain Characteristics of JFET
13. Calculation of Ripple factor using Half wave rectifier
14. Calculation of Ripple factor using Full wave rectifier
15. Non linear wave shaping – clippers/clampers

Note: Minimum 10 experiments should be carried.

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PROBLEM SOLVING USING PROGRAMMING LAB

I B.Tech – II Semester (Code: 20CSL203/CSL01)

Practical	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite:

Course Objectives: Students will be able to

CO-1	Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, Arithmetic rules.
CO-2	Develop problem-solving skills to translate "English" described problems into Programs written using C language.
CO-3	Use Conditional Branching, Looping, and Functions.
CO-4	Apply pointers for parameter passing, referencing and differencing and linking data structures.
CO-5	Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Learning Outcomes: Students will be able to

CLO-1	Choose and Analyze the right data representation formats and algorithms to solve the problem.
CLO-2	Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
CLO-3	Write the program on a computer, edit, compile, debug, correct, recompile and run it.
CLO-4	Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	2	-	-	-	-	-	-	-	-	-	-	3	2
CLO-2	2	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CLO-3	2	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CLO-4	2	1	2	-	-	-	-	-	-	-	-	-	-	2	1

LIST OF EXPERIMENTS

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 200	0.50 per unit	
201 – 400	100 plus	0.65 per unit

401 – 600	230 plus	0.80 per unit
601 and above	390 plus	1.00 per unit
Commercial Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 50	0.50 per unit	
100 – 200	50 plus	0.60 per unit
201 – 300	100 plus	0.70 per unit
301 and above	200 plus	1.0 per unit

2. Write a C program to evaluate the following (using loops):
   a) $1 + x^2/2! + x^4 / 4!+ \ldots$upto ten terms
   b) $x + x^3/3! + x^5/5!+ \ldots$ upto 7 digit accuracy
3. Write a C program to check whether the given number is
   a) Prime or not.
   b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
   a) Mean
   b) Mode
   c) Median
   d) Variance.
5. Write a C program to read a list of numbers and perform the following operations
   a) Print the list.
   b) Delete duplicates from the list.
   c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message "Element not found in the List".
7. Write a C program to read two matrices and compute their sum and product.
8. A menu driven program with options (using array of character pointers).
   a) To insert a student name
   b) To delete astudent name
   c) To print the names of students
9. Write a C program to read list of student names and perform the following operations
   a) To print the list of names.
   b) To sort them in ascending order.
   c) To print the list after sorting.
10. Write a C program that consists of recursive functions to
    a) Find factorial of a given number
    b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.
11. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required, if the requested copies are available the total cost of the

requested copies is displayed otherwise the message "required copies not in stock" is displayed. Write a program for the above in structures with suitable functions.

12. Write a C program to read a data file of students' records with fields (Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

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PROBABILITY & STATISTICS
II B. Tech. – III Semester (Code: 20CS301/MA03)

Lectures	:	2 Hours /Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	The Aptitude to learn about the concept of random variables and their properties
CO-2	Evaluation of various Sampling Distributions
CO-3	Statistical analysis for making decisions and choosing actions.
CO-4	The Capability to infer the meaningful conclusions to the given data using statistical methods like Point Estimation

Course Learning Outcomes: Students will be able to

CLO-1	Apply various continuous probability distributions to solve the complex problems that will arise in engineering applications.
CLO-2	Understand the terms sample, population, null hypothesis, alterative hypothesis and perform statistical analysis related to a single population and draw appropriate conclusions about the population parameter.
CLO-3	Perform statistical analysis related to a single population or two populations and draw appropriate conclusions about the parameters of the populations.
CLO-4	Fit a least squares curve/plane to the given data points. Compute the correlation coefficient between the values of two random variables. Apply the technique of one way ANOVA to the given statistical data and draw conclusions.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-2	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-3	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-4	3	2	3	-	2	-	-	-	-	-	-	-	3	3	2

UNIT-1 (12 Hours)

Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Gamma Distribution and its applications, Beta Distribution and its applications, Joint Distributions (Discrete),Joint Distributions (Continuous).Populations and Samples, Law of large numbers, Central limit theorem and its applications, The sampling distribution of the mean (σ unknown),The sampling distribution of the variance.
(Sections 5.1, 5.2, 5.3, 5.5,5.7, 5.8, 5.10, 6.1, 6.2, 6.3, 6.4 of Text Book [1])

UNIT-2 (12 Hours)

Point estimation, Interval estimation, Tests of Hypotheses, Null Hypothesis and Tests of Hypotheses, Hypothesis concerning one mean, Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Paired sample t test.
(Sections 7.1,7.2, 7.4, 7.5, 7.6, 8.2, 8.3, 8.4 of Text Book [1])

UNIT-3 (12 Hours)

The Estimation of variances, Hypotheses concerning one variance, Hypotheses Concerning two variances, Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Procedure for Analysis of Variance (ANOVA) for comparing

the means of k (>2) groups- one way classification (Completely randomized designs), Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- two way classification (Randomized block designs). (Sections 9.1, 9.2, 9.3, 10.1, 10.2, 10.3, 12.2, 12.3 of Text Book [1])	
UNIT-4	(12 Hours)
Multivariate Analysis: The concept of bivariate relationship, scatter diagram, Pearson‟s correlation and correlation matrix. Simple linear regression model and assumptions, Least Squares Estimation of the parameters of the model, Testing the significance of the model. Regression versus Correlation, Multiple linear regression model with k explanatory variables and assumptions of the model. . Test for significance of the regression model and individual regression coefficients. Applications of multiple regression analysis. (1st and 2nd Chapters of Text Book [2])1	
Text Books :	1. Miller & Freund‟s “Probability and Statistics for Engineers”,Richard A. Johnson,8th Edition, PHI. 2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3rd edition, Wiley.
References :	1. R.E Walpole, R.H. Myers & S.L. Myers „Probability & Statistics for Engineers and Scientists‟, 6th Edition, PHI. 2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K.Kapoor, 11th Edition, Sultan Chand & Sons. 3. Murray R Spiegel , John J. Schiller, R. Alu Srinivas Probability & Satistics‟, Schaum’s outline series. 4. K.V.S. Sarma, Statistics Made Simple – Do it yourself on PC‟, Prentice Hall India, Second Edition, 2015.

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DATA STRUCTURES
II B.Tech – III Semester(Code: 20CS302)

Lectures	:	2 Hours /Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Problem Solving using Programming (20CS204)

Course Objectives: Students will be able to

CO-1	Understand the role of Data structures in structuring and analysis procedure of an algorithm.
CO-2	Learn the concept of Stack, Queue and various Sorting techniques.
CO-3	Understand the concept of Binary Tree, Binary Search Tree and AVL tree.
CO-4	Learn the concept of Hashing and Heap Data Structures.

Course Learning Outcomes: Students will be able to

CLO-1	Analyse the algorithms to determine the time & space complexity and manipulating data using array or list representation.
CLO-2	Implement the applications of Stack & Queue and analyze the various sorting techniques.
CLO-3	Construct and implement different tree algorithms like binary tree, BST and AVL tree.
CLO-4	Implement and analyze various hashing techniques and priority queues.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	2	-	-	-	-	-	-	-	-	-	-	3	2
CLO-2	2	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CLO-3	2	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CLO-4	2	1	2	-	-	-	-	-	-	-	-	-	-	2	1

UNIT-1 (12 Hours)

Algorithm Analysis: Mathematical Background, Model, what to Analyze, Running Time Calculations.
Lists: Abstract Data Types, The List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT: addition, multiplication operations.

UNIT-2 (12 Hours)

Stacks and Queues: The Stack ADT and its applications such as Infix to Postfix expression conversions, Evaluation of Postfix expressions. The Queue ADT, Queue Application-Radix sort.
Basic Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Shell sort

UNIT-3 (12 Hours)

Trees: Preliminaries, Binary Trees, Expression trees, The Search Tree ADT, Binary Search Trees, Implementations, AVL Trees-Single Rotations, Double rotations, Implementations.

UNIT-4 (12 Hours)

Hashing: General Idea, Hash Function, Separate Chaining, Open Addressing.
Priority Queues (Heaps): Model, Simple implementations, Binary Heap, Heap Sort.

Text Books :	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education , 2013, Second Edition, ISBN- 978-81-7758-358-8.
References :	1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia, 2006, Second Edition, ISBN- 81-203-1177-9. 2. Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998, Second Edition, ISBN-978-0-534-39080-8 3. Aho, J.E. Hopcroft and J.D. Ullman, "Data Structures andAlgorithms", Pearson Education Asia, 1983, 1st edition, ISBN- 978-0201000238.

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OBJECT ORIENTED PROGRAMMING
II B. Tech. – III Semester (Code: 20CS303)

Lectures	:	2 Hours /Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Understand advantages of OO programming over procedural oriented programming, learn the basics of variables, operators, control statements, arrays, classes and objects.
CO-2	Understand, write and implement the following concepts: Inheritance, Interfaces, Packages, Strings and Collections.
CO-3	Understand and write programs on Exception Handling, I/O, and Multithreading.
CO-4	Understand and implement applications using Applets, AWT, Swings and Events.

Course Learning Outcomes: Students will be able to

CLO-1	Demonstrate OOP concepts, its advantages over structured programming.
CLO-2	Develop and implement Inheritance, polymorphism.
CLO-3	Analyze Exception Handling, Multithreading, I/O.
CLO-4	Create code for Event Handling, Applets, AWT and Swings.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
20CS303.1	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
20CS303.2	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
20CS303.3	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
20CS303.4	3	2	3	-	2	-	-	-	-	-	-	-	3	3	2

UNIT-1 (12 Hours)

The History and Evolution of Java
An Overview of Java
Data Types, Variables and Arrays
Operators
Control Statements
Introducing Classes
A Closer Look at Methods and Classes

UNIT-2 (12 Hours)

Inheritance
Packages and Interfaces
Strings: String Constructors, Any 10 String class methods, StringBuffer class, Any 10 StringBuffer class methods, Introducing StringBuilder class.
Type Wrappers: Auto boxing/unboxing.
Collections: Collections Overview, Names of Collection Interfaces,
Collection Classes: LinkedList<String>, Array List<String>

UNIT-3 (12 Hours)

Exception Handling
Multithreaded Programming

I/O: I/O Basics, Reading Console Input, Writing Console Output, The Print Writer class, Reading and Writing Files, Automatically Closing a File.	
UNIT-4	(12 Hours)
The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphics class **Event Handling:** **Introducing the AWT:** Window Fundamentals, **AWT components:** Label, Text Field, Text Area, Checkbox, Checkbox Group, Button, **Layout Managers:** Flow Layout, Grid Layout, and Border Layout. **GUI Programming with Swing:** The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, **Swing Components:** JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box	
Text Books :	"Java The Complete Reference", 9th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi, 2014.
References :	1. "Big Java ", 4th Edition, Cay Horstman, John Wiley & Sons, 2009. 2. "Java How to Program (Early Objects)", H. M. Dietel and P. J. Dietel, 11th edition Pearson Education, 2018.

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OPERATING SYSTEMS
II B.Tech – III Semester(Code: 20CS304)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None

Course Objectives: Students will be able to

CO-1	To learn the mechanism of OS to handle processes & Threads and their communication.
CO-2	To learn the algorithms involved in CPU scheduling.
CO-3	To gain knowledge on concepts that includes Dead locks, Main Memory and Virtual Memory.
CO-4	To know the concepts related to File Access Methods & Mass Storage structure.

Course Learning Outcomes: Students will be able to

CLO-1	Understand different structures, services of the operating system, the use of scheduling and operations on process & threads.
CLO-2	Develop various process scheduling algorithms for a given specification of CPU utilization, throughput, TAT, WT & RT.
CLO-3	Develop various Memory Organization Techniques for optimally allocate memory to process by increasing Memory Utilization & Access time.
CLO-4	Design & implement various file allocation methods & Disk Scheduling Algorithms.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	1	-	1	-	1	1	1	-	1	1	-	1
CLO-2	1	2	2	1	-	-	-	1	-	-	-	-	1	2	-
CLO-3	1	2	2	1	-	-	-	1	-	-	-	-	1	2	-
CLO-4	1	2	2	1	-	-	-	1	-	-	1	1	1	2	-

UNIT-1 (12 Hours)

Introduction: What OSs Do, Computer System Operation, Storage structure, OS Structure, OS Operations.

Operating-System Structures: OS Services, User and operating system Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation, OS Structure.

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter- process Communication.

Threads: Overview, Multicore Programming, Multithreading Models.

[Sections:1.1, 1.2.1, 1.2.2,1.4,1.5, 1.5.1,2.1, 2.2,2.3,2.4, 2.5, 2.6, 2.7,2.7.1,2.7.2,2.7.3,2.7.4

3.1, 3.2,3.3,3.4, 4.1,4.2,4.3]	
UNIT-2	(12 Hours)
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms. **Process Synchronization:** Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of Synchronization, Monitors. [Sections : 6.1,6.2,6.3, 5.1,5.2,,5.3,5.4,5.5,5.6,5.7,5.8]	
UNIT-3	(12 Hours)
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery. **Main Memory:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table. **Virtual-Memory: Background**, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Other Considerations. [Sections; 7.1,7.2,7.3,7.4,7.5,7.6,7.7,8.1,8.2,8.3,8.4,8.5,8.6,9.1, 9.2,9.3,9.4,9.5,9.6,9.9]	
UNIT-4	(12 Hours)
File System Interface: File concept, Access Methods, Directory and Disk Structure, **File System Implementation**: File System Structures, Directory Implementation, Allocation Methods **Protection**: Goals of Protection, Principles of Protection, Domain of Protection- Domain Structure, Access Matrix, Implementation of Access Matrix. **Mass Storage Structure**: Over View, Disk Structure, Disk Scheduling, Disk Management, RAID levels [Sections:10.1,10.2,10.4,10.5,10.7,11.1,11.2,11.3,11.5,12.1,12.3,12.4,14.1,14.2,14.3,14.3.1,14.4,14.5]	
Text Books :	Silberschatz & Galvin, "Operating System Concepts", 10th edition, John Wiley & Sons (Asia) Pvt.Ltd. **ISBN 9781118063330.**
References :	1. William Stallings, "Operating Systems –Internals and Design Principles", 9/e, Pearson**. ISBN 9789352866717** 2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Co., 2019 edition. **ISBN-9780074635513** 3. Andrew S.Tanenbaum, "Modern Operating Systems", 4nd edition,2017 PHI.**ISBN-9781292061429**

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COMPUTER ORGANIZATION
II B. Tech. – III Semester (Code: 20CS305)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Digital logic design(20CS205)

Course Objectives: Students will be able to

CO-1	Represent the data, micro-operations, and hardware implementation of arithmetic, logic and shift unit.
CO-2	Know about the instruction codes and generation of control signals using hardwired and micro-programmed approaches.
CO-3	Learn about the different types of instructions and arithmetic operations.
CO-4	Understand the organization of the memory and I/O units.

Course Learning Outcomes: Students will be able to

CLO-1	Representation of the data, micro-operations, and implementation of hardware for arithmetic, logic and shift unit.
CLO-2	Understand the flow of execution of instruction by the CPU and design of the control unit using hardwired and micro-programmed approaches.
CLO-3	Study the instruction set of basic computer and draw the flowcharts of the arithmetic operations.
CLO-4	Understand the memory and I/O organizations.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	POs												PSOs		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	-	2	-	-	-	-	-	-	-	-	3	1	1	1
CLO-2	2	-	3	-	-	-	-	-	-	-	-	3	1	1	1
CLO-3	2	3	1	-	-	-	-	-	-	-	-	3	1	1	1
CLO-4	2	-	3	-	1	-	-	-	-	-	-	3	1	1	1

UNIT-1 (11 Hours)

DATA REPRESENTATION: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation.

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic micro operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

UNIT-2 (11 Hours)

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic.

MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

UNIT-3	(11 Hours)
CENTRAL PROCESSING UNIT: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer vs Complex Instruction Set Computers. **COMPUTER ARITHMETIC:** Addition and Subtraction, Multiplication Algorithms, Division Algorithms.	
UNIT-4	(12 Hours)
THE MEMORY SYSTEM: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware. **INPUT-OUTPUT ORGANIZATION**: Peripheral Devices, Input-Output Interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor.	
Text Books :	Computer System Architecture, M.MorrisMano, 3rdEdition, Pearson/PHI
References :	1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill. 2. Computer Organization and Architecture, William Stallings, Sixth Edition, Pearson/PHI.

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LINUX ESSENTIALS

II B. Tech. –III Semester (Code: 20CSL301/SO01)

Practicals	:	5 Hours/Week (2T+3P)	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Organize and manipulate files and directories
CO-2	Use the vi text editor to create and modify files
CO-3	Use SED command for insertion, deletion, and search and replace (substitution).
CO-4	Understand pattern scanning and processing using AWK.
CO-5	Create structured shell programming which accept and use positional parameters and exported variables.
CO-6	Understand File management system calls to provide I/O support for storage device types and multiple users.

Course Learning Outcomes: Students will be able to

CLO-1	Organize and manipulate files and directories, Use the vi text editor to create and modify files
CLO-2	Use SED command for insertion, deletion and search and replace (substitution)
CLO-3	Understand pattern scanning and processing using AWK
CLO-4	Create structured shell programming which accepts and uses positional parameters and export variables. Understand file management system calls to provide I/O support for storage device types and multiple users.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2		2	3	-	-	-	-	-	-	2	2	2	2
CLO-2	2	2		2	2	-	-	-	-	-	-	2	2	2	2
CLO-3	2	2		2	2	-	-	-	-	-	-	2	2	3	2
CLO-4	2	2		2	2	-	-	-	-	-	-	2	2	2	3

UNIT-1 (4 Hours)

Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands –Editing with vi, cat, mv, rm, cp , wc . File attributes and permissions and knowing them. The ls command with options. Changing file permissions: (chmod) the relative and absolute permissions changing methods. Recursively changing file permissions. Directory Permissions. Other Basic commands: cal, date, df, du, find, jobs, kill ,less and more, ps, set, wc, who.

LIST OF EXPERIMENTS

1. Obtain the following results (i) To print the name of operating system (ii) To print the login name (iii) To print the host name
2. Find out the users who are currently logged in and find the particular user too.
3. Display the calendar for (i) Jan 2000 (ii) Feb 1999 (iii) 9th month of the year 7 A.D (iv) For the current month (v) Current Date Day Abbreviation , Month Abbreviation along with year

4. Display the time in 12-Hour and 24 Hour Notations.
5. Display the Current Date and Current Time.
6. Display the message "GOOD MORNING" in enlarged characters.
7. Display the name of your home directory.
8. Create a directory SAMPLE under your home directory.
9. Create a subdirectory by name TRIAL under SAMPLE.
10. Change to SAMPLE.
11. Change to your home directory.
12. Change from home directory to TRIAL by using absolute and relative pathname.
13. Remove directory TRIAL.
14. Create a directory TEST using absolute pathname.
15. Using a single command change from current directory to home directory.
16. Remove a directory using absolute pathname.
17. Create files my file and your file under Present Working Directory.
18. Display the files my file and your file.
19. Append more lines in the my file and your file files.
20. How will you create a hidden file?.
21. Copy myfile file to emp.
22. Write the command to create alias name for a file.
23. Move yourfile file to dept.
24. Copy emp file and dept file to TRIAL directory
25. Compare a file with itself.
26. Compare myfile file and emp file.

UNIT-2 (4 Hours)

The Stream editor(sed):Line addressing, multiple instructions, context addressing, writing selected lines to a file, text editing ,substitution, basic regular expressions.
File Handling and Text Processing utilities: grep, egrep, fgrep.
AWK: sample awk filtering , splitting a line into fields, formatting output, variables and expressions, comparison operators, number processing, storing awk programs in a file, the BEGIN and END sections, Built in variables and arrays, control structures.

LIST OF EXPERIMENTS

1. A. Create the following file as sed.lab: unix is great os. unix is open source. unix is free os. learn operating system. Unix linux which one you choose.(*Each sentence in a line*)

1. Replace 'unix' with 'linux'.
2. Replace only the third (3rd) instance of 'unix' with 'linux'.
3. Try sed 's/unix/linux/g' sed.lab.
4. Replace 'unix' with 'linux' but only on line 3.
5. Add a new line, 'Actually Windows is best' after the second line.

B.

1. Viewing a range of lines of a document
2. Viewing the entire file except a given range
3. Viewing non-consecutive lines and ranges
4. Replacing words or characters inside a range
5. Using regular expressions
6. Viewing lines containing with a given pattern
7. Inserting spaces in files
8. Performing two or more substitutions at once

C.

1. Design a command **"wishme"** that will great you "good morning","good Afternoon", according to current time.

2. Design a command **"fags"** thats will list the files and their ages, to date.

3. Design a command **"word-freq"** that will print the words and number of Occurrences of that word in the given text.

UNIT-3	(4 Hours)

Shell programming: shell, functions of shell, metacharacters, input redirections and output redirections, pipes, shell as a programming language, shell variables, predefined local variables, predefined environment variables, arithmetic and conditional expressions, control structures, positional parameters, passing command line arguments, built in shell commands, shell programs, functions and arrays.

LIST OF EXPERIMENTS

1.
   A. Design a command **" which"** that prints the path of the command given as Argument
   B. Design a command **"filelist[-c <char>]"** which prints all file names beginning with The charter specified as argument to the command ,if the position is not specified It should print all the file names.
   C. Design a command **getline[-f <filename> -n <line number>]** which prints the line number **lineno** in the file specified with -f option.If the line number is not specified it should list all the lines in the given file
   D. Design a command **monthly-file[-m <month>]** which list the files created in a given month where month is argument to be command. If the options is not specified it list the files in all the months.
2.
   A. Design a command **list lines[-f <file name> -v <varname>]** which prints the line from the given file **file name** ,which containing the variable **varname**.if **arname** Is not specified it should list ,all the lines.
   B. Design a command **avg[-n <colon> -f <file name>]** which prints the average of the given column in a file where **colon** and **file name** are arguments to the commands

UNIT-4	(4 Hours)

File management System calls: Regular File management system calls: open(), read(), write(), lseek(), close(), unlink(), stat(), getdents().

LIST OF EXPERIMENTS

1. Write a C program to copy data from source file to destination file, where the file names are provided as command-line arguments.
2. Write a C program that reads every 100th byte from the file, where the file name is given as command-line argument.
3. Write a C program to display information of a given file which determines the type of file and inode information, where the file name is given as command-line arguments.

Text Books :	1. UNIX Concepts and Applications, Sumitabha Das, 4th edition, TATA McGraw Hill. 2. UNIX for programmers and users", 3rd edition, Graham Glass, King Ables, Pearson education.
References :	1. "The Design of UNIX operating System", Maurice J.Bach, PHI. 2. "Advanced programming in the UNIX environment", W Richard Stevens, 2nd Edition, Pearson education. 3. "UNIX programming environment", Kernighan and pike, Pearson Education. 4. "Your UNIX the ultimate guide, Sumitabha Das, TMH, 2nd edition. 5. "Advanced UNIX programming", Marc J. Rochkind, 2nd edition,Pearson Education.

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DATA STRUCTURES LAB
II B. Tech. – III Semester (Code: 20CSL302)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Understand and program basic data structures like arrays and linked lists with their applications.
CO-2	Understand and Program data structures like stacks and queues with their applications. Understand and implement sorting algorithms.
CO-3	Understand and program on trees, binary trees, binary search trees, avl trees, expression trees and their traversal methods.
CO-4	Understand and program on priority queues, hashing and their mechanisms. Basic knowledge of graphs representations and traversing methods.

Course Learning Outcomes: Students will be able to

CLO-1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CLO-2	Understand basic data structures such as arrays, linked lists, stacks and queues.
CLO-3	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
CLO-4	Solve problem involving trees and heaps, Describe the hash function and concepts of collision and its resolution methods

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	-	3	-	-	-	-	-	-	-	3	3	3	-
CLO-2	2	2	-	2	-	-	-	-	-	-	-	-	2	2	-
CLO-3	2	-	-	2	-	-	-	-	-	-	-	2	2	2	-
CLO-4	3	-	3	3	3	-	-	-	-	-	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write a program to perform the following operations on Array List
   a). Creation, b). Insertion, c). Deletion, d). Search, e). Display.
2. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list using array list.
3. Write a program to perform the following operations on Single Linked List.
   a). Creation, b). Insertion, c). Deletion, d). Search, e). Display.
4. Write a program to perform the following operations on Doubly Linked List.
   a). Creation, b). Insertion, c). Deletion, d). Search, e). Display.
5. Write a program to perform addition and multiplication of two polynomials using single Linked List.
6. Write a program to convert the given infix expression into postfix expression using stack.
7. Write a program to evaluate the postfix expression using stack.
8. Write a program that performs Radix sort on a given set of elements using queue.
9. Write a program to read n numbers in an array. Redisplay the array list with elements being

sorted in ascending order using the following techniques
a). Bubble Sort, b). Selection Sort, c). Insertion Sort, d).Shell Sort.

10. Write a program to perform Binary Search tree operations and traversals.
11. Write a program to implement AVL tree that interactively allows
    a). Insertion, b). Deletion, c). Find_min, d). Find_max.
12. Write a program to read n numbers in an array. Redisplay the arraylist with elements being sorted in ascending order using Heap Sort.

Text Books :	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education
References :	1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "DataStructures Using C", Pearson Education Asia, 2004. 2. Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", ThomsonBrooks / COLE, 1998.

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OBJECT ORIENTED PROGRAMMING LAB
II B.Tech – III Semester (Code: 20CSL303)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO1	Understand advantages of OO programming over procedural oriented programming, learn the basics of variables, operators, control statements, arrays, classes and objects.
CO2	Understand, write and implement the following concepts: Inheritance, Interfaces, Packages, Strings and Collections.
CO3	Understand and write programs on Exception Handling, I/O, and Multithreading.
CO4	Understand and implement applications using Applets, AWT, Swings and Events.

Course Learning Outcomes: Students will be able to

CLO-1	Demonstrate OOP concepts, its advantages over structured programming.
CLO-2	Develop and implement Inheritance, polymorphism.
CLO-3	Analyze Exception Handling, Multithreading, I/O.
CLO-4	Create code for Event Handling, Applets, AWT and Swings.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-2	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-3	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CLO-4	3	2	3	-	2	-	-	-	-	-	-	-	3	3	2

LIST OF EXPERIMENTS

1. Write a Java program to declare, initialize and accessing the elements of Single dimensional Arrays, Multidimensional Arrays.
2. Write a Java program to demonstrate recursion.
3. Write a Java program to demonstrate static member, static method and static block.
4. Write a Java program to demonstrate method overloading and method overriding using simple inheritance.
5. Write a Java program to demonstrate multiple inheritance using interfaces.
6. Write a Java program to demonstrate packages.
7. Write a Java program to demonstrate String class methods.
8. Write a Java program to create user defined exception class, use couple of built-in Exception classes.
9. Write a Java program to demonstrate inter-thread communication.
10. Write an Applet program to demonstrate passing parameters to Applet, Graphics, Color and Font classes.
11. Write a Java program to demonstrate handling Action events, Item events, Key events, Mouse events, Mouse Motion events.
12. Write a GUI application which uses the following AWT components Label, Text Field, Text Area, Checkbox, Checkbox Group, Button.
13. Write a GUI application using JTable, JTree, JCombo Box.

Text Books :	"Java The Complete Reference", 9th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi, 2014.
References :	1. "Big Java ", 4th Edition, Cay Horstman, John Wiley & Sons, 2009. 2. "Java How to Program (Early Objects)", H. M. Dietel and P. J. Dietel, 11th edition Pearson Education, 2018.

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PROFESSIONAL ETHICS & HUMAN VALUES
II B. Tech. – III Semester (Code: 20CS306)

Lectures	:	2 Hours/Week	Continuous Assessment	:	30
Final Exam	:		Final Exam Marks	:	

Pre-Requisite: None.

Course Objectives: Students will be able to

CO1	Comprehend a specific set of behavior and values any professional must know and must abide by, including confidentiality, honesty and integrity. Understand engineering as social experimentation.
CO2	Know, what are safety and Risk and understand the responsibilities and rights of an engineer such as collegiality, loyalty, bribes/gifts.
CO3	Recognize global issues visualizing globalization, cross-cultural issues, computer ethics and also know about ethical audit
CO4	Discuss case studies on Bhopal gas tragedy, Chernobyl and about codes of Institute of Engineers, ACM

Course Learning Outcomes: Students will be able to

CLO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field and the multiple ethical interests at stake in a real-world situation or practice
CLO-2	Articulate what makes a particular course of action ethically defensible, Assess their own ethical values and the social context of problems.Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data.
CLO-3	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research
CLO-4	Paticipate in the discussion of the case studies like bhopal gas tragedy,Chernobyl disasters.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	-	-	3	1	3	-	-	-	-	-	-	-
CLO-2	-	-	-	-	-	3	1	3	-	-	-	-	-	-	-
CLO-3	-	-	-	-	-	3	1	3	-	-	-	-	-	-	-
CLO-4	-	-	-	-	-	3	1	3	-	-	-	-	-	-	-

UNIT-1 (8 hours)

Human Values: Morals, Values and Ethics, Integrity, Work Ethics, Service and Learning, Civic Virtue, Respect for Others, Living Peacefully, Caring and Sharing, Honesty, Courage, Value Time, Cooperation, Commitment and Empathy, Spirituality, Character.

Engineering Ethics: History of Ethics, Engineering Ethics, Consensus and Controversy, Profession and Professionalism, Professional Roles of Engineers, Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry, Kohlberg's Theory, Gilligan's Argument, Heinz's Dilemma.

Engineering as Social Experimentation: Comparison with Standard Experiments, Knowledge Gained, Conscientiousness, Relevant Information, Learning from the Past, Engineers as Managers,

Consultants, and Leaders, Accountability, Roles of Codes, Codes and Experimental Nature of Engineering.	
UNIT-2	(8 hours)
Engineers' Responsibility for Safety and Risk: Safety and Risk, Types of Risks, Safety and the Engineer, Designing for Safety, Risk-Benefit Analysis, Accidents. **Responsibilities and Rights**: Collegiality, Two Senses of Loyalty, Obligations of Loyalty, Misguided Loyalty, Professionalism and Loyalty, Professional Rights, Professional Responsibilities, Conflict of Interest, Self-interest, Customs and Religion, Collective Bargaining, Confidentiality, Acceptance of Bribes/Gifts, Occupational Crimes, Whistle Blowing.	
UNIT-3	(8 hours)
Global Issues: Globalization, Cross-cultural Issues, Environmental Ethics, Computer Ethics, Weapons Development, Ethics and Research, Analyzing Ethical Problems in Research, Intellectual Property Rights (IPRs). **Ethical Audit:** Aspects of Project Realization, Ethical Audit Procedure, The Decision Makers, Variety of Interests, Formulation of the Brief, The Audit Statement, The Audit Reviews.	
UNIT-4	(8 hours)
Case Studies: Bhopal Gas Tragedy, The Chernobyl Disaster. **Appendix 1**: Institution of Engineers (India): Sample Codes of Ethics. **Appendix 2**: ACM Code of Ethics and Professional Conduct.	
Text Books :	"Professional Ethics & Human Values", M.GovindaRajan, S.Natarajan, V.S.SenthilKumar, PHI Publications 2013.
References :	"Ethics in Engineering", Mike W Martin, Ronald Schinzinger, TMH Publications.

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MICROPROCESSORS & MICROCONTROLLERS
II B. Tech. – IV Semester (Code: 20CS401)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None

Course Objectives: Students will be able to

CO-1	Identify the hardware and software elements of the 8086 microprocessor.
CO-2	Understand instruction set of 8086 microprocessor with examples.
CO-3	Interface the interrupt device with 8086 microprocessor.
CO-4	Comprehend the architecture of 8051 microcontroller and its applications.

Course Learning Outcomes: Students will be able to

CLO-1	Identification of the functional blocks of hardware and describe the assembly language programming structure of the 8086 microprocessor.
CLO-2	Understand the different instructions of 8086 microprocessor and apply these in assembly language programming for solving problems.
CLO-3	Describe the interrupt responses of an 8086 microprocessor with interrupt applications.
CLO-4	Identification of hardware and software elements of the 8051 microcontroller and develop the applications using 8051 microcontroller.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	1	2	-	1	-	-	-	-	-	-	1	1	1	1
CLO-2	2	2	3	1	1	-	-	-	-	-	-	1	1	1	1
CLO-3	2	-	1	1	-	-	-	-	-	-	-	1	1	1	1
CLO-4	2	-	1	-	1	-	-	-	-	-	-	1	1	1	1

UNIT-1 (15 Hours)

Introduction to 8086: The 8086 Microprocessor family-overview; 8086 internal architecture: the execution unit, the BIU;
8086 family assembly language programming: program development steps, constructing the machine codes for 8086 instructions, writing program for use with an assembler, assembly language program development tools.

UNIT-2 (15 Hours)

Implementing standard Program Structures in 8086 Assembly language: simple sequence programs, jumps flags and conditional jumps, if-then if-then-else multiple if-then-else programs, while do programs, repeat-until programs, instruction timing and delay loops;
Strings and procedures: the 8086 string instructions, writing and using procedures; assembler directives.

UNIT-3 (15 Hours)

8086 system connections and timing: The basic 8086 Microcomputer system, 8086 Bus activities during the read machine cycle, 8086 Bus activities during the write machine cycle 8086 pin diagram; **8086 Interrupts and Interrupt Applications:** 8086 Interrupts and Interrupts Responses, 8259A priority interrupt controller.

UNIT-4 (15 Hours)

8051 MICROCONTROLLERS: Microcontrollers and embedded processors, overview of the 8051 family; architecture of 8051, pin diagram of 80851; 8051 assembly language

programming; JUMP, LOOP, CALL instructions; I/O port programming; addressing modes; LCD and keyboard interfacing.	
Text Books :	1. Douglas V. Hall, "Microprocessors and Interfacing", Tata McGraw-Hill, 3rd Edition,2017. 2. Muhammad Ali Mahadi and Janice Gillespie Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education 2021.
References :	1. Yu-cheng Liu, Glenn A. Gibson, "Microcomputer systems: The 8086 /8088 Family architecture, Programming and Design", Second edition, Prentice Hall of India, 2003. 2. Barry B. Brey, "The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, PentiumPro Processor, Pentium II, Pentium III, Pentium IV, Architecture, Programming & Interfacing", Sixth Edition, Pearson Education Prentice Hall of India, 2002.

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WEB TECHNOLOGIES

II B. Tech. – IV Semester (Code: 20CS402)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Know elements and tags of HTML and apply Styles using Cascading Style Sheets.
CO-2	Know basics of Java Script, Functions, Events, Objects and Working with browser objects.
CO-3	Know basics of XML, DOM and advanced features of XML.
CO-4	To convert XML documents into other formats and XSLT.

Course Learning Outcomes: Students will be able to:

CLO-1	Analyze a web page and identify its elements and attributes
CLO-2	Create web pages using XHTML and Cascading Styles sheets.
CLO-3	Build dynamic web pages using JavaScript (client side programming). Students will be able to write a well formed / valid XML documents
CLO-4	Understand Web server and its working. Design and implement a client server internet application that accommodates specific requirements and constraints.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CLO-2	2	2	3	1	-	-	-	-	-	-	-	-	-	2	-
CLO-3	1	2	3	1	-	-	-	-	-	-	-	-	-	1	-
CLO-4	1	3	3	1	-	-	-	-	-	-	-	-	-	3	1

UNIT-1 (12 hours)

HTML5: Fundamentals of HTML, Working with Text, Organizing Text in HTML, Working with Links and URLs, Creating Tables, Working with Images, Colors, and Canvas, Working with Forms.

UNIT-2 (12 hours)

CSS: Overview of CSS, Backgrounds and Color Gradients in CSS, Fonts and Text Styles, Creating Boxes and Columns Using CSS, Displaying, Positioning, and Floating an Element, List Styles, Table Layouts.

Dynamic HTML: Overview of JavaScript, JavaScript Functions, Events, Image Maps, and Animations.

UNIT-3 (12 hours)

Dynamic HTML (Cont..): JavaScript Objects, Working with Browser Objects, Working with Document Object.

Document Object Model: Understanding DOM Nodes, Understanding DOM Levels, Understanding DOM Interfaces- Node, Document, Element, Attribute.

UNIT-4 (12 hours)

XML: Working with Basics of XML, Implementing Advanced Features of XML, Working with XSLT.

AJAX: Overview of AJAX, Asynchronous Data Transfer with XML Http Request, Implementing AJAX Frameworks, Working with jQuery.

Text Books :	KogentLearningSolutionsInc.,HTML5BlackBook:CoversCSS3,Javascript, XML,

	XHTML, Ajax, PHP and Jquery
References :	1. Harvey M.Deitel and Paul J. Deitel, "Internet &World Wide Web How to Program", 4/e, Pearson Education. 1. Jason Cranford Teague, "Visual Quick Start Guide CSS DHTML & AJAX", 4e, Pearson Education. 2. Tom Nerino Doli smith, "Java Script & AJAX for the web", Pearson Education2007. 3. Joshua Elchorn, "Understanding AJAX",PrenticeHall2006.

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DATABASE MANAGEMENT SYSTEM
II B. Tech. – IV Semester (Code: 20CS403)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling.
CO-2	Implement formal relational operations in relational algebra and SQL.
CO-3	Identify the Indexing types and normalization process for relational databases
CO-4	Use mechanisms for the development of multi user database applications.

Course Learning Outcomes: Students will be able to

CLO-1	Ability to apply knowledge of database design methodology which give a good formal foundation in relational data model and Understand and apply the principles of data modeling using ER Model.
CLO-2	Familiar with relational DB theory and will able to write relational algebra expressions, Relational Calculus and SQL.for query
CLO-3	Design database schema and Identify and solve the redundancy problem in database tables using normalization.
CLO-4	Understand transaction processing, concurrency control and recovery techniques.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CLO-2	2	2	3	1	-	-	-	-	-	-	-	-	-	2	-
CLO-3	1	2	3	1	-	-	-	-	-	-	-	-	-	1	-
CLO-4	1	3	3	1	-	-	-	-	-	-	-	-	-	3	-

UNIT-1 (12 hours)

Databases and Database Users: Introduction - An Example, Characteristics of the Database Approach, Actorson the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach.

Database System Concepts and Architecture : DataModels, Schemas and Instances ,Three-SchemaArchitecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs.

Data Modeling Using the Entity-Relationship (ER) Model : Using High-Level Conceptual Data Models forDatabase Design, An Example Database Application, Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database - ER Diagrams, Naming Conventions, and Design Issues

UNIT-2 (12 hours)

The Relational Algebra and Relational Calculus : Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, The Tuple Relational Calculus, The Domain Relational Calculus.

Schema Definition, Constraints, Queries, and Views : SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL,INSERT, DELETE, and UPDATE Statements in SQL , Views (Virtual Tables) in SQL

UNIT-3	(12 hours)

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes - Dynamic Multilevel Indexes Using B+-Trees.

Functional Dependencies and Normalization for Relational Databases: 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.

Relational Database Design Algorithms and Further Dependencies: Properties of Relational Decompositions -Lossless Join Decomposition and Dependency Preserving Decomposition, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT-4	(12 hours)

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering,Validation (Optimistic) Concurrency Control Techniques, Multiple Granularity.

Database Recovery Techniques : Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging.

Text Books :	Fundamentals of Database Systems, Ramez Elmasri and Navathe Pearson Education, 6thedition
References :	1. Introduction to Database Systems, C.J. Date Pearson Education 2. Database Management Systems, Raghu Rama krishnan, Johannes Gehrke, TATA McGraw Hill3rdEdition 3. Database System Concepts, Silberschatz, Korth, McGraw hill,5thedition

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DESIGN AND ANALYSIS OF ALGORITHMS
II B. Tech. – IV Semester (Code: 20CS404)

Lectures	:	2 Hours/Week, 1 Hour Tutorial	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Data Structures (20CS302)

Course Objectives: Students will be able to

CO-1	Understand about designing and effectiveness of an algorithm, and applying of Master Theorem to find the complexity.
CO-2	Strengthen divide and conquer paradigms andknow the optimal solution finding with the greedy method.
CO-3	Acquaintance of algorithm design strategies of Dynamic programming and easy know the major graph algorithms and their analyses.
CO-4	Get the ability to backtracking,branch with bound values and NP problems.

Course Learning Outcomes: Students will be able to

CLO-1	Analyze the performance of algorithms through various strategies and apply the Master theorem to estimate the complexity of divide-and-conquer algorithms.
CLO-2	Apply the divide-and-conquer and greedy techniques to solve problems and perform complexity analysis.
CLO-3	Articulate on graph problems and identify the applicability of the dynamic-programming paradigm for designing solutions to problems.
CLO-4	Find all possible solutions for combinatorial and optimixation problems using Backtracking and Branch and Bound algorithms and also categorize the P and NP complex problems.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	2	3	2	3	-	2	-	-	2	2	3	3	3	1
CLO-2	2	2	2	2	2	-	2	-	-	2	2	2	2	3	1
CLO-3	3	3	3	3	3	-	2	-	-	2	2	3	2	3	2
CLO-4	2	2	1	2	2	-	2	-	-	2	2	2	2	3	2

UNIT-1 (12 hours)

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Bigoh-notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.
Master Theorem: Introduction, Generic Form- Case1, Case2, Case3, Inadmissible equations, Application to common algorithms.

UNIT-2 (12 hours)

Divide and conquer: General method, applications-Quicksort, Merge sort, Stassen's matrix multiplication.
Greedy method: General method, applications-Job sequencing with deadlines, Fractional knapsack problem, Minimum cost spanning trees-Prims, Kruskal, Single source shortest path problem-Dijkstra.

UNIT-3 (12 hours)

Dynamic Programming: General method, applications-0/1 knapsack problem, Travelling salesperson problem, Longest common sequence algorithm, Multi stage graphs using Forward& Backward approach, Reliability design.
Graph Applications: Graph traversals – Depth first, Breadth first, Bio Connected Components,

Strongly Connected Components.	
UNIT-4	(12 hours)
Backtracking: General method, applications-n-queen problem, sum of subsets problem. Branch and Bound: General method, applications- 0/1 knapsack problem-LC Branch and Bound solution. **NP-Hard and NP-Complete problems:** Basic concepts, non-deterministic algorithms, NP-Hardand NP Complete classes, Cook's theorem.	
Text Books :	E. Horowitz, S.Sahniand S. Rajasekaran, "Fundamentals of Computer Algorithms" ,GalgotiaPublication.
References :	1. T. H. Cormen, Leiserson, Rivestand Stein, "Introduction of Computer Algorithm", PHI. 2. SaraBasse, A.V.Gelder, "Computer Algorithms", Addison Wesley.

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TECHNICAL ENGLISH

II B.Tech – IV Semester (Code: 20CS405/EL02)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	At enhancing the vocabulary competency of the students
CO-2	To enhance the understanding of the elements of grammar
CO-3	To enable the students to use proper spelling, grammar in constructing the sentences
CO-4	To enhance the learner's ability to communicate accurately

Course Learning Outcomes: Students will be able to

CLO-1	To comprehend the importance, barriers and strategies of listening skills in English.
CLO-2	To illustrate and impart practice Phonemic symbols, stress and intonation.
CLO-3	To practice oral skills and receive feedback on learners' performance.
CLO-4	To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	-	-	-	-	-	3	3	2	-	-	-	-
CLO-2	-	-	-	-	-	-	-	-	3	3	2	-	-	-	-
CLO-3	-	-	-	-	-	-	-	2	3	3	2	-	-	-	-
CLO-4	-	-	-	-	-	-	-	2	3	3	2	-	-	-	-

UNIT-1 (12 hours)

1.1 Vocabulary Development: Familiarizing Idioms &Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing &Email Writing

UNIT-2 (12 hours)

2.1 Vocabulary Development: Analogous words, Gender Sensitive language
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting &Proposing
2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-3 (12 hours)

3.1 Vocabulary Development: Abbreviations &Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival &Adverbial groups
3.3 Language Development: Transcoding (Channel conversion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-4 (12 hours)

4.1 Vocabulary Development: Corporate vocabulary
4.2 Grammar for Academic Writing: Inversions &Emphasis
4.3 Language Development: Reading Comprehension
4.4 Technical Writing: Resume Preparation

References :	1. Communication Skills, Sanjay Kumar & Pushpa Latha. Oxford University Press:2011. 2. Technical Communication Principles and Practice. Oxford University Press:2014. 3. Advanced Language Practice, Michael Vince. Macmillan Publishers:2003. 4. Objective English (Third Edition), Edgar Thorpe & Showick. Pearson Education:2009 5. English Grammar: A University Course (Second Edition), Angela Downing Philip Locke, Routledge Taylor &Francis Group 2016

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PYTHON PROGRAMMING

II B.Tech – III Semester (Code: 20CSL401/SO02)

Practicals	:	5 Hours/Week (2T+3P)	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Understand and write code using the basics of Python, Statements, Expressions, Conditional Executions, and Functions.
CO-2	Write code for Iteration, Strings, File I/O.
CO-3	Write code in creating, usage of Lists, Dictionaries, and Tuples.
CO-4	Understand the concepts of Object Orientation, Databases and write code implementing them.

Course Learning Outcomes: Students will be able to

CLO-1	Understanding of scripting and the contributions of python language.
CLO-2	Understanding of Python especially the object-oriented concepts, using databases.
CLO-3	Able to design and implement machine learning solutions to classification, regression.
CLO-4	Able to design and implement machine learning solutions to clustering problems and features of various data.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	-	-	-	-	-	-	-	-	-	-	2	3	3	3
CLO-2	3	-	-	-	-	-	-	-	-	-	-	2	3	3	3
CLO-3	3	-	-	-	-	-	-	-	-	-	-	2	3	3	3
CLO-4	3	-	-	-	-	-	-	-	-	-	-	2	3	3	3

UNIT-1 (32 Hours)

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution,
Alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short-circuit evaluation of logical expressions.

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

Strings: string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

Files I/O:persistence, opening files, text files and lines, reading files, searching through a file, letting the user choose the file name, using try except and open, writing files.

Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments.

Dictionaries: dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.

Tuples: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignment with dictionaries, the most common words, using tuples as keys in dictionaries, sequences.

Object-Oriented Programming: Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem–Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances, Inheritance.

Using Databases and SQL: Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.

LIST OF EXPERIMENTS

1. Write a python program to check if the number is positive or negative or zero and display an appropriate message.
2. Write a python program to take a string from user and count number of vowels present and percentage of vowels in it.
3. Write a python program to find the most frequent words in a text file.
4. Write a Python Program to Find the Sum of first n Natural Numbers.
5. Write a python program to find the numbers which are divisible by 7 and multiple of 5 between 1500 and 2700.
6. Write a Python Program to solve Quadratic Equation.
7. Create a program that ask the user for a number and then prints out a list of all the divisors of that number.
8. Write a Python Program to Find HCF or GCD.
9. Write a Python Program to Find LCM.
10. Write a Python program to construct the following pattern, using a nested loop number.

    1
    22
    333
    4444
    55555
    666666

11. Write a Python Program to sort the given words in Alphabetic Order.
12. Write a Python function to create the HTML string with tags around the word(s).
13. Write a Python program to reverse words in a string.
14. Write a Python program to strip a set of characters from a string.
15. Write a python function to find the maximum and minimum of a list of numbers.
16. Write a Python Program to Find the Square Root.
17. Write a Python Program to Convert Decimal to Binary Using Recursion.
18. Write a python recursive function to a find the factorial of a given number.
19. Write a python program to find the longest word in each line of given file.
20. Write a Python program to combine each line from first file with the corresponding line in second file.
21. Write a Python program to read a random line from a file.
23. Write a Python program to split a list every Nth element.

    Sample list: ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n']
    Expected Output: [['a', 'd', 'g', 'j', 'm'], ['b', 'e', 'h', 'k', 'n'], ['c', 'f', 'i', 'l']]

24. Write a Python program to compute the similarity between two lists.

    Sample data: ["red", "orange", "green", "blue", "white"], ["black", "yellow", "green", "blue"]
    Expected Output:
    Color1-Color2: ['white', 'orange', 'red'] Color2-Color1: ['black', 'yellow']

25. Write a Python program to replace the last element in a list with another list.

    Sample data: [1, 3, 5, 7, 9, 10], [2, 4, 6,8] Expected Output: [1, 3, 5, 7, 9, 2, 4, 6, 8]

26. Write a Python program to find the repeated items of a tuple.

27. Write a Python program to convert a list with duplicates to a tuple without duplicates.
28. Write a Python program to reverse the elements of a tuple.
29. Write a Python program to replace last value of tuples in a list.
    Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]
    Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]
31. Write a Python program to combine two dictionaries by adding values for common keys.
    d1 = {'a': 100, 'b': 200, 'c':300}
    d2 = {'a': 300, 'b': 200, 'd':400}
    Sample output: Counter({'a': 400, 'b': 400, 'd': 400, 'c': 300})
33. Write a Python program to create and display all combinations of letters, selecting each letter from a different key in a dictionary.
    Sample data : {'1':['a','b'], '2':['c','d']} Expected Output:
    ac ad bc bd
34. Write a Python program to get the top three items in a shop.
    Sample data: {'item1': 45.50, 'item2':35, 'item3': 41.30, 'item4':55, 'item5': 24} Expected Output:
    item4 55 item1 45.5
    item3 41.3
35. Write a Python program to match both key values in two dictionaries.
    Sample dictionary: {'key1': 1, 'key2': 3, 'key3': 2}, {'key1': 1, 'key2': 2}
    Expected output: key1: 1 is present in both x and y
36. Write a Python class named Rectangle constructed by a length and width and a method which will compute the area of a rectangle.
37. Write a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.
38. Write a Python program to create a Single Linked List using classes.
39. Write a Python program to create a FIFO queue using classes.
40. Predict the output of following Python programs and write the justification.

```
class X(object):
    def __init__(self,a):
        self.num = a
    def doubleup(self):
        self.num *= 2

class Y(X):
    def __init__(self,a): X.__init__(self, a)
    def tripleup(self):
        self.num *= 3

obj = Y(4)
print(obj.num)

obj.doubleup()
print(obj.num)

obj.tripleup()
print(obj.num)
```

41. Predict the output of following Python programs and write the justification.

```
# Base or Super class class Person(object):
    def __init__(self, name):
        self.name = name

    def getName(self):
        return self.name
```

```
    def isEmployee(self):
        return False

# Inherited or Subclass (Note Person in bracket)
class Employee(Person):
    def __init__(self, name, eid):
    ''' In Python 3.0+, "super().__init__(name)" also works'''
        super(Employee, self).__init__(name)
        self.empID = eid

    def isEmployee(self):
        return True

    def getID(self):
        return self.empID

# Driver code
emp = Employee("Geek1", "E101")
print(emp.getName(), emp.isEmployee(), emp.getID())
```

42. Create a employees database with the following attributes and insert rows. employee_id, first_name, last_name, email, phone_number, hire_date, job_id, salary, commission_pct, manager_id, department_id
43. Write a query to get the highest, lowest, sum, and average salary of all employees.
44. Write a query to get the average salary for all departments employing more than 10 employees.
45. Write a query to find the names (first_name, last_name), the salary of the employees whose salary is greater than the average salary.
46. Write a query to get nth max salaries of employees.

Text Books :	1. A Python Book: Beginning Python, Advanced Python, and Python Exercises, Dave Kuhlman, Open Source MIT License. 2. Python for Data Analysis, Wes McKinney, O' Reilly.
References :	1. Python Data Science Handbook-Essential Tools for Working with 2. Data Science from Scratch, JoelGrus, O'Reilly.

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WEB TECHNOLOGIES LAB
II B.Tech – IV Semester (Code: 20CSL402)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Know elements and tags of HTML and apply Styles using Cascading Style Sheets.
CO-2	Know basics of Java Script, Functions, Events, Objects and Working with browser objects.
CO-3	Know basics of XML, DOM and advanced features of XML.
CO-4	To convert XML documents into other formats and XSLT.

Course Learning Outcomes: Students will be able to

CLO-1	Analyze a web page and identify its elements and attributes
CLO-2	Create web pages using XHTML and Cascading Styles sheets.
CLO-3	Build dynamic web pages using JavaScript (client side programming). Students will be able to write a well formed / valid XML documents
CLO-4	Understand Web server and its working. Design and implement a client-server internet application that accommodates specific requirements and constraints.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CLO-2	2	2	3	1	-	-	-	-	-	-	-	-	-	2	-
CLO-3	1	2	3	1	-	-	-	-	-	-	-	-	-	1	-
CLO-4	1	3	3	1	-	-	-	-	-	-	-	-	-	3	-

LIST OF EXPERIMENTS

1. Write HTML5 document to design a webpage. (Using all fundamental elements, Organizing text, Links, URLs and Tables).
2. Write HTML5 document to design a webpage. (Using Images, Colors, Canvas & Forms).
3. Write codes for different types of styles in CSS3.
4. Write java scripts covering Function, Arrays and Events.
5. Demonstrate JavaScript objects.
6. Demonstrate browser objects.
7. Demonstrate Document Object Model for an HTML document.
8. Write well-formed and valid XML documents.
9. Write code for converting XML document to HTML using XSLT.
10. Build a webpage using JQuery and its components.

Text Books :	Kogent Learning Solutions Inc.,HTML5 BlackBook: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery.
References :	1. Harvey M. Deitel and Paul J.Deitel, "Internet &World Wide Web How to Program", 4/e, Pearson Education. 2. Joshua Elchorn, "Understanding AJAX", Prentice Hall 2006.

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RDBMS Lab

II B.Tech – IV Semester(Code: 20CSL403)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

CO-1	Analyze the student on database languages.
CO-2	Interpret the Knowledge on database design.
CO-3	Determine the knowledge on key constraints and Normalization.
CO-4	Determine the knowledge on procedures and functions.

Course Learning Outcomes: Students will be able to:

CLO-1	Design database by using ER Diagrams
CLO-2	Implement DDL, DML, DCL Commands using SQL.
CLO-3	Apply key constrains to get a normalized database.
CLO-4	Implement procedures and functions using PL/SQL

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CLO-2	2	2	3	1	-	-	-	-	-	-	-	-	-	2	-
CLO-3	1	2	3	1	-	-	-	-	-	-	-	-	-	1	-
CLO-4	1	3	3	1	-	-	-	-	-	-	-	-	-	3	-

LIST OF EXPERIMENTS

Experiment 1: Working with ER Diagram

Example: ER Diagram for Sailors Database

Entities:

1. Sailor

2. Boat Relationship:
   Reserves

Primary Key Atributes:

1. SID (Sailor Entity)
2. BID (Boat Entity)

Experiment 2: Working with DDL, DML, DCL and Key Constraints

Creation, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables) Examples Using Select Command.

Experiment 3: Working with Queries and Nested QUERIES

Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION,

INTERSET, Constraints

Expriment 4: Working with Queries USING Aggregate Operators & views

Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and Dropping of Views

Experiment 5: Working with Conversion Functions & String Functions

Queries using Conversion Functions (TO_CHAR, TO_NUMBER AND TO_DATE), String Functions (CONCATENATION, LPAD, RPAD, LTRIM, RTRIM, LOWER, UPPER, INITCAP, LENGTH, SUBSTR AND INSTR), Date Functions (SYSDATE, NEXT_DAY, ADD_MONTHS, LAST_DAY, MONTHS_BETWEEN), LEAST, GREATEST, TRUNC, ROUND, TO_CHAR, TO_DATE

Experiment 6: Working with LOOPS using PL/SQL

Program Development using WHILE LOOPS, FOR LOOPS, Nested Loops using ERROR Handling.

Experiment 7: Working with Functions Using PL/SQL

Program Development using Creation of Stored Functions, Invoke Functions in SQL Statements and Write Complex Functions.

Experiment 8: Working with Stored Procedures

Programs Development using Creation of Procedures, Passing Parameters IN and OUT of

PROCEDURES

Experiment 9: Working with CURSORS

Develop Programs using Features Parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of Clause and CURSOR Variables.

Experiment 10: Working with Triggers using PL/SQL

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Text Books :	1. Oracle PL/SQL by Example, Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rdEd 2. Oracle Database Logic PL/SQL Programming, ScottUrman, TataMc-Graw Hill. 3. SQL and PL/SQL for Oracle 10g, Black Book, Dr.P.S.Deshpande

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AUTOMATA THEORY AND FORMAL LANGUAGES
III B.Tech - V Semester (Code: 20CS501)

Lectures	:	2 Hours/Week, Tutorial:1	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Discrete Mathematical Structures (20CS205)

Course Objectives: The student will be able to

CO-1	Understand the theory of automata and formal languages. Construct finite automata, and conversion between DFA and NFA.
CO-2	Demonstrate the connection between regular expressions, languages, and finite automata
CO-3	Demonstrate the connection between pushdown automata and context-free languages and Context Free Grammars.
CO-4	Construct Turing machines for a given task. Understand undecidability problems about Turing Machine and post correspondence problem (PCP).

Course Learning Outcomes: Students will be able to

CLO-1	Understand automata and its applications. Construct finite automaton, and convert between deterministic and non-deterministic implementations.
CLO-2	Convert regular expression to finite automata and vice versa. Construct minimized DFA.
CLO-3	Construct push down automata for various context free languages. Demonstrate the connection between PDA and context-free grammars.
CLO-4	Construct Turing machines for various languages. Understand Undecidability and Undecidable problems about TM and Post Correspondence Problem.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	1	1	-	-	-	-	-	-	-	-	1	-	-	2
CLO-2	2	1	1	-	1	-	-	-	-	-	-	1	1	2	2
CLO-3	3	3	3	1	-	-	-	-	-	-	-	1	1	2	2
CLO-4	3	3	3	2	-	-	-	-	-	-	-	1	1	2	2

UNIT-I — **15 Periods**

Automata: Why Study Automata Theory, The central concepts of automata theory - Alphabets, Strings, Languages, Problems.

Finite Automata: An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) – Definition ofNFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA.

Automata with ϵ transitions: Use of ϵ - transition, notation for an ϵ - NFA, Epsilon closures, extended transitions and languages, Eliminating ϵ - transitions.

UNIT-2 — (15 Periods)

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.

Properties of Regular Languages: Proving languages are not regular – Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata – Minimization of DFA.
UNIT-3 (15 Periods)
(Construction based treatment & proofs are excluded) **Context Free Grammars:** Context Free Grammars, Parse Trees, ambiguous grammars. **Pushdown Automata:** Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA‘s and CFG‘s. **Context free languages:** Normal form‘s for context- Free grammars, the pumping lemma forcontext free languages.
UNIT-4 (15 Periods)
Properties of Context free languages: closure properties for context free languages, Decision properties for CFL‘s. **Introduction to Turing Machines:** The Turing Machine, programming techniques for Turing machines. **Undecidability:** a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post‘s Correspondence problem.

Text Books :	John E.Hopcroft, Rajeev Motwani, & Jeffery D. Ullman, “ Introduction to Automata Theory Languages and Computations”, Pearson Education, 2008, Third Edition, ISBN: 978-8131720479.
References :	1. KLP Mishra & N.Chandrasekharan, -“Theory of Computer Science: Automata, Languages and Computation”, PHI,2006,Third Edition, ISBN: 978-8120329683. 2. 2. H.R.Lewis, C.H.Papadimitriou, – “Elements of The theory of Computation“,Pearson Education, 2015, Second Edition, ISBN: 978-93-325-4989-0.

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COMPUTER NETWORKS
III B. Tech. – V Semester (Code: 20CS502)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Operating Systems (20CS304)

Course Objectives: Students will be able to

CO-1	Understand the basic concepts of data communication, layered model, protocols and OSI&TCP layers
CO-2	Understand the basic concepts of Data Link control, Network Layer Design Issues, Routing Algorithms & Congestion.
CO-3	Understand the basic concepts of Quality of service, Network Layer & Transport Layer
CO-4	Understand the basic concepts of TCP, UDP & Application Layer

Course Learning Outcomes: Students will be able to

CLO-1	Able to learn types of communications, topologies, OSI, TCP/IP protocol architectures along with error detection and correction mechanisms and also the working of data link layer
CLO-2	Able to learn types of communications, topologies, OSI, TCP/IP protocol architectures along with error detection and correction mechanisms and also the working of data link layer
CLO-3	Able to know the transport layer issues, establishment of remote procedure calls and TCP segment header.
CLO-4	Able to learn the working of TCP and UDP and differennt application layer issues.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	2	-	1	-	2	1	-	2	3	-	1	2	1
CLO-2	1	-	2	-	1	1	1	-	1	-	-	1	1	1	2
CLO-3	-	-	2	1	1	-	-	-	-	1	1	1	1	2	1
CLO-4	1	2	2	2	1	-	-	-	-	1	1		1	2	1

UNIT-1 (14 Hours)

Data Communications & Networking Overview: A Communications Model, Data Communications, Data Communication Networking.

Protocol Architecture: The Need for a Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP/IP Protocol Architecture.

Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, Error Detection, Error Correction.

UNIT-2 (16 Hours)

DATA Link Control: Flow Control, Error Control.

Network Layer: Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram

Subnets.

Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.

UNIT-3	(16 Hours)

Quality of Service: Requirements, Techniques for Achieving Good Quality of Service The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols. The **Transport Layer, The Transport Service:** Services Provided to the Upper Layers, Transport Service Primitives, Berkeley sockets

Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.

UNIT-4	(14 Hours)

The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol.

The Internet Transport Protocols (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management.

Application Layer: The Domain Name System (DNS): The DNS Name Space, Resource Records, Name Servers.

Text Books :	1. BehrouzA.Forouzan,"DataCommunicationsandNetworking",4th edition, TMH. 2. Tanenbaum,"ComputerNetworks",5thEdition,PearsonEducation,2011
References :	1. WayneTomasi,"IntroductiontoDataCommunicationsandNetworking",PHI. 2. BehrouzA.Forouzan,"DataCommunicationsandNetworking",Fourtheditio n,TMH 3. God Bole,"DataCommunications&Networking",TMH. 4. Kurose & Ross, "COMPUTER NETWORKS– A Top-down approach featuring the Internet", Pearson Education,AlbertoLeon,Garciak. 5. LeonGartia,IndraWidjaja,"CommunicationNetworksFundamentalConcep tsandKeyArchitectures",TMH. 6. NaderF.Mir,"ComputerandCommunicationNetworks",PHI.

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SOFTWARE ENGINEERING
III B.Tech – V Semester (Code: 20CS503)

Lectures	:	3 Hours/Week,	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: The student will be able to

CO-1	Understand different process models of Software Engineering and
CO-2	Understand Agile Software Development. How to collect requirements from client and how to analyze the collected requirements.
CO-3	Understand how to design and implement the Software Product or Project.
CO-4	Understand the concepts of Testing and Measuring the software project or Product.

Course Learning Outcomes: Students will be able to

CLO-1	Understand different generic process models.
CLO-2	Understand agile process models. Develop different analysis models for the software project.
CLO-3	Develop different design models for the software project.
CLO-4	Understand different testing strategies, software metrics and measures.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2		-	1	-	-	-	-	-	2	-	2	1	-
CLO-2	-	3	1	-	-	-	1	1	2	1	2	-	1	1	-
CLO-3	-	3	1	-	-	-	1	1	2	1	2	-	2	1	-
CLO-4	-	3	1	2	-	-	-	-	-	-	2	-	2	1	-

UNIT-1 (15 Periods)

INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving Role of Software, Software, the Changing Nature of Software, Legacy Software, Software Myths.

A GENERIC VIEW OF PROCESS: Software Engineering - A Layered Technology, a Process Framework, the CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Product and Process.

PROCESS MODELS: Prescriptive Models, the Waterfall Model, Incremental Process Models, Evolutionary Models, the Unified Process.

UNIT-2 (15 Periods)

AN AGILE VIEW OF PROCESS: What Is Agility? , What Is an Agile Process? , Agile Process Models.

REQUIREMENTS ENGINEERING: A Bridge To Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use-cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

BUILDING THE ANALYSIS MODEL: Requirements Analysis, Analysis Modeling

Approaches, Data Modeling Concepts, Flow-Oriented Modeling, Class Based Modeling Creating a Behavioral Model.

UNIT-3 (15 Periods)

DESIGN ENGINEERING: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts The Design Model, Pattern Based Software Design.

CREATING AN ARCHITECTURAL DESIGN: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Assessing Alternative Architectural Designs.

MODELING COMPONENT-LEVEL DESIGN: What Is a Component? , Designing Class-Based Components, Conducting Component-Level Design, Designing Conventional Components.

PERFORMING USER INTERFACE DESIGN: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT-4 (15 Periods)

SOFTWARE PROCESS AND PROJECT METRICS: Introduction: Metrics Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics with Process.

SOFTWARE QUALITY ASSURANCE: Quality Concepts, Quality Movement, SQA, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Reliability, ISO 9000 Quality Standards, SQA Plan.

SOFTWARE TESTING STRATEGIES: Strategic Approach, Strategic Issues, Test strategies for Conventional Software, White box testing, Black Box testing, Test strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging.

Text Books :	Roger S.Pressman, "Software Engineering- A Practitioner's Approach", **McGraw Hill** , 2014, 8th. **McGraw Hill** ISBN- **978-0078022128**
References :	1. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2008, Third Edition,. ISBN- **978-8122423600** 2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer, 2005, Second Edition. ISBN- 978-0-387-20881-7 3. Ian Sommerville, "Software Engineering", Pearson Education, 2017, 10th Edition. ISBN-13: 978-9332582699 4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Fundamentals of Software Engineering", PHI, 2002, Second Edition. ISBN - 978-8120322424 5. RajibMall, "Fundamentals of Software Engineering", PHI, 2018, 5thEdition, PHI. ISBN- 978-9388028028

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SOFT SKILLS LAB

III B.Tech – V Semester(Code: 20CSL501/SO03)

Practicals	:	3 Hours/Week (1T+2P)	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: None

Course Objectives: Students will be able to

CO-1	To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
CO-2	To know the importance of interpersonal and intrapersonal skills in an employability setting.
CO-3	Actively participate in group discussions / interviews and prepare & deliver Presentations.
CO-4	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, stress management and leadership quality.

Course Learning Outcomes: Students will be able to

CLO-1	Use appropriate body language in social and professional contexts.
CLO-2	Demonstrate different strategies in presenting themselves in professional contexts.
CLO-3	Analyze and develop their own strategies of facing the interviews successfully.
CLO-4	Develop team coordinating skills as well leadership qualities.

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	-	-	-	-	-	1	2	3	1	2	2	1	1
CLO-2	-	-	-	-	-	-	-	1	1	3	1	2	2	1	1
CLO-3	-	-	-	-	-	-	-	1	1	3	1	2	2	1	1
CLO-4	-	-	-	-	-	-	-	1	3	3	1	3	2	1	1

LIST OF EXPERIMENTS

1. Body Language & Identity Management
- a. Facial Expressions – Kinesics - Occulesics
- b. Haptics - Proxemics
- c. Para Linguistics
- d. Appearance
- e. Identity Management Communication

2. Emotional Intelligence & Life Skills
- a. Self Awareness through Johari Window and SWOC analysis
- b. Self Motivation
- c. Empathy
- d. Assertiveness & Managing Stress
- e. Positive Attitude
- f. Time Management
- g. Goal Setting: Short term, Long Term, Vision, Mission.

3. Business Presentations
- a. Preparing effective Presentations Power Point Presentations
- b. Power Point Presentations
- c. Using Visual Aids
- d. Mock Presentations

4. Employability Skills

a. Group Discussion b. Team Building and Leadership Qualities c. Interview Skills	
References :	**1.** Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016 **2.** The Definitive Book of Body Language, Allan & Barbara. Pease International:2004 3. Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998 4. English for Jobseekers, Lina Mukhopadhyay. Cambridge University Press:2013 5. The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

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SOFTWARE ENGINEERING LAB
III B.Tech – V Semester(Code: 20CSL502)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: The student will be able to

CO-1	Able to prepare problem statement and SRS (software requirements specification) document.
CO-2	Able to develop various analysis modeling diagrams.(use-case, activity, class etc.)
CO-3	Able to develop various design representations (component diagrams and deployment diagrams)
CO-4	Able to perform various testing techniques (black box and white box)

Course Learning Outcomes: Students will be able to

CLO-1	Able to prepare SRS document.
CLO-2	Able to develop various analysis modeling representations using StarUML tool.
CLO-3	Able to develop various design representations using StarUML tool.
CLO-4	Able to perform various testing strategies on code.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	POs												PSOs		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	2	-	-	-	1	-	-	3	3	3	-	3	3	-
CLO-2	2	3	2	-	3	1	-	-	3	3	3	-	3	3	-
CLO-3	2	-	3	-	3	1	-	-	3	3	3	-	3	3	-
CLO-4	2	-	-	2	3	1	-	-	3	3	3	-	2	3	-

LIST OF EXPERIMENTS

Tool Required: StarUML

LIST OF EXPERIMENTS

16. Write down the problem statement for a suggested system of relevance.
17. Do requirement analysis and develop Software Requirement Specification Sheet(SRS) for suggested system.
18. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
19. To perform the user‘s view analysis for the suggested system: Use case diagram.
20. To draw the structural view diagram for the system: Class diagram, object diagram.
21. To draw the behavioral view diagram : State-chart diagram, Activity diagram
22. To perform the behavioral view diagram for the suggested system : Sequence diagram,Collaboration diagram
23. To perform the implementation view diagram: Component diagram for the system.
24. To perform the environmental view diagram: Deployment diagram for the system.
25. To perform various testing using the testing tool unit testing, integration testing for a samplecode of the suggested system.

Note: Minimum 8 experiments should be carried.

List of Practical's

Choose any one project and do the above exercises for that project

1. Student Result Management System
2. Library management system
3. Inventory control system
4. Accounting system
5. Fast food billing system
6. Bank loan system
7. Blood bank system
8. Railway reservation system
9. Automatic teller machine
10. Video library management system
11. Hotel management system
12. Hostel management system
13. E-ticking
14. Share online trading
15. Hostel management system
16. Resource management system
17. Court case management system

Text Books :	Roger S.Pressman, "Software Engineering- A Practitioner's Approach", **McGraw Hill** , 2014, 8th. **McGraw Hill** ISBN- **978-0078022128**
References :	1. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2008, Third Edition,. ISBN- **978-8122423600** 2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer, 2005, Second Edition. ISBN- 978-0-387-20881-7 3. Ian Sommerville, "Software Engineering", Pearson Education, 2017, 10th Edition. ISBN-13 : 978-9332582699 4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Fundamentals of Software Engineering", PHI, 2002, Second Edition. ISBN - 978-8120322424 5. RajibMall, "Fundamentals of Software Engineering", PHI, 2018, 5thEdition, PHI. ISBN- 978-9388028028

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ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
III B. Tech. – V Semester (Code: 20CS506/MC03)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	--

Pre-Requisite: None

Course Objectives: Students will be able to

CO-1	Generalize the effect of precolonial and colonial period on Indian Traditional Knowledge System, traditional Medicine
CO-2	Discover the knowledge of ITK in Production, Construction, Physics, Chemistry, Architecture and Vastu
CO-3	Discriminate the contribution of India in Mathematics, Astronomy & Astrology
CO-4	Propose the importance of Yoga in holistic living

Course Learning Outcomes: Students will be able to

CLO-1	Understand the concept of Indian Traditional knowledge and its importance
CLO-2	Compare the Indian traditional knowledge Systems with Other Global systems.
CLO-3	Understand the concept of yoga and its correlations to science.
CLO-4	Study various case studies related to traditional knowledge.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	1	2	3	-	3	-	-	-	-	-	-	1	3	3	3
CLO-2	1	2	3	-	3	-	-	-	-	-	-	1	3	3	3
CLO-3	1	2	3	-	3	-	-	-	-	-	-	1	3	3	3
CLO-4	1	2	3	-	3	-	-	-	-	-	-	1	3	3	3

UNIT-1 (8 Hours)

Historical Background: TKS during the Pre-colonial and Colonial Period

Indian Traditional Knowledge System

Traditional Medicine: Ayurveda, Simple Definition, Origin, The Great Three Classics of Ayurveda, The Branches of Ayurveda, Basic Concepts of Ayurveda, Purusha/Prakruti, Manifestation of Creation, Mental Constitution, Vata, Pitta and Kapha: The Three Doshas

UNIT-2 (8 Hours)

Traditional Production and Construction Technology: Social Conditions and Technological Progress, The Impetus for Metallurgy, Social Needs and Technological Applications, State Support of Technology, India and the Industrial Revolution.

History of Physics and Chemistry: Philosophy and Physical Science, Optics and Sound, The Laws of Motion, The Five Basic Physical Elements, Indian Ideas about Atomic Physics.

Traditional Art and Architecture and Vastu Shashtra: The Principles of Vastu are simple

UNIT-3 (8 Hours)

Origin of Mathematics: The Decimal System in Harappa, Panini and Formal Scientific Notation, The Indian Numeral System, Emergence of Calculus, The Spread of Indian Mathematics, The Concept of Zero.

Astronomy and Astrology

TKS and the Indian Union: Protection and the Legislative Frameworks in India, Comment, Sui Generis System, Trade Secrets and Know-how, Geographical Indications Bill, Protection of Plan varieties and Farmers Rights Bill, Rights of Communities, Monitoring Information on Patent Applications World-wide.	
UNIT-4	(8 Hours)
Common Yoga Protocol: Introduction, What is Yoga? Brief History and Development of Yoga, The fundamentals of Yoga, **General Guidelines for Yoga Practice:** Before the practice, During the Practice, After the Practice, Food for Thought, How Yoga can Help. **Invocation, 2. Sadilaja/Cālana Kriyās /Loosening Practices**, **Yogāsanas:** **Standing Postures: Tāḍāsana** (Palm Tree Posture), **Vṛkṣāsana** (The Tree Posture), **Pāda-Hastāsana** (The Hands to Feet Posture), **Ardha Cakrāsana** (The Half Wheel Posture), **Trikonāsana** (The Triangle Posture) **Sitting Postures: Bhadrāsana** (The Firm/Auspicious Posture), **Vajrāsana** (Thunderbolt Posture), **Uṣṭrāsana** (Camel Posture), **Śaśakāsana** (The Hare Posture), **Vakrāsana** (The Spinal Twist Posture), **Kapālabhāti 5. Prānāyāma: naḍīśodhana or anuloma viloma prānāyāma** (Alternate Nostril Breathing), **Śītalī Prāṇāyāma, Bhrāmarī Prāṇāyāma** (Bhrāmarī Recaka) **6. Dhyāna 7. *Sankalpa* 8. Śantih pātha**	
Text Books :	1. Traditional Knowledge System in India, Amit Jha, 2009 2. Common YOGA Protocol, Ministry of Ayush
References :	Traditional Knowledge System & Technology in India, Basanta Kumar Mohanta, Vipin Kumar Singh, 2012

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DATAWAREHOUSING AND DATA MINING
III B.Tech – V Semester (Code: PE02)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Database Management Systems (18CS403) and basic mathematics

Course Objectives: Students will be able to

CO-1	Identify the scope and necessity of Data Warehousing & Mining for the society.
CO-2	Understand importance of data, data preprocessing techniques to solve the real time problems.
CO-3	Understand and implement classical models and algorithms in data warehouses and data mining.
CO-4	Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Learning Outcomes: Students will be able to

CLO-1	Understand scope and necessity of Data Warehousing & Mining for the society.
CLO-2	Understand, implement preprocessing techniques and classification models and develop skills in selecting appropriate preprocessing and classification algorithms.
CLO-3	Understand, implement classical models and develop skills in selecting appropriate association rule mining algorithms.
CLO-4	Understand, implement clustering models and develop skills in analyzing appropriate clustering algorithms to solve real time problems.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	POs												**PSOs**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	3	3	3	2	3	1	1	-	-	-	-	2	-	-	-
CLO-2	3	3	3	2	3	1	1	-	-	-	-	2	-	-	-
CLO-3	3	3	3	2	3	1	1	-	-	-	-	2	-	-	-
CLO-4	3	3	3	2	3	1	1	-	-	-	-	2	-	-	-

UNIT-1 (15 Hours)

Data Warehouse and OLAP Technology: Introduction, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation from Data Warehousing to Data Mining.
Data Mining: Introduction, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT-2 (15 Hours)

Data Pre-processing: Importance of Data Process, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.
Classification and Prediction: Introduction to Classification and Prediction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction -

Decision Tree Induction, Attribute Selection Measures, Bayesian Classification.	
UNIT-3	(15 Hours)
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and a Road Map, Efficient and Scalable Frequent Item-set Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	
UNIT-4	(15 Hours)
Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods- k-Means and k-Medoids, Hierarchical Methods- Agglomerative and Divisive Hierarchical Clustering, Density-Based Methods-DBSCAN, Grid- Based Methods- STING, Outlier Analysis.	
Text Books :	Jiawei Han Micheline Kamber – "Data Mining Concepts & Techniques", 2nd ed., Morgan Kaufmann Publishers.
References :	1. "Data Warehousing in the real world – A Practical guide for Building decision support systems", Sam Anahory, Dennis Murray, Pearson Education. 2. "Data Mining (Introductory and Advances Topics)", Margaret H. Dunham, Pearson Education.

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ARTIFICIAL INTELLIGENCE
III B.Tech – VI Semester(Code: PE04)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Data Structures(20CS302), Design and Analysis of Algorithms (20CS404), Discrete Mathematics (20CS206)

Course Objectives: Students will be able to

CO-1	understand the fundamental concepts of artificial intelligence, and their environment, various Search techniques
CO-2	understand knowledge representation using predicate logic and rules
CO-3	understand the planning techniques.
CO-4	understand how to design and solve Learning techniques and Expert systems.

Course Learning Outcomes: Students will be able to

CLO-1	Understand the fundamental concepts of artificial intelligence, search techniques for solving simple AI problems and their environments.
CLO-2	Apply knowledge representation using predicate logic and rules.
CLO-3	Utilize the planning techniques.
CLO-4	Possess the knowledge of the concepts of Learning and Expert Systems.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	-	2	-	1	-	1	2	1	-	-	-	1	1	1
CLO-2	-	-	2	-	2	-	2	3	-	2	1	-	1	2	2
CLO-3	-	2	-	-	-	2	-	-	1	-	2	-	2	1	1
CLO-4	-	1	-	1	-	-	1	-	1	-	-	1	2	2	1

UNIT-1 (15 Hours)

Introduction to AI: What is AI? , Foundations of AI, History of AI, State of the Art.

Intelligent Agents: Agents and Environments, Good Behavior: Concept of Rationality, The Nature of Environments And The Structure of Agents.

Solving Problems by Searching: Problem Solving Agents, Searching for Solutions.

Uninformed Search Strategies: Breadth First Search, Uniform Cost Search, Depth First Search, Iterative Deepening DFS and Bi-directional Search.

Informed (Heuristics) Search Strategies: Greedy BFS, A* Algorithm, Heuristics Functions.

Beyond Classical Search: Local Search Algorithms and Optimization Problems- Hill Climbing, Simulated Annealing, Searching with Non Deterministic Actions, AND-OR Graphs, Online Search Agents and Unknown Environments.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Local Search in CSPs, Structure of Problems.

UNIT-2 (15 Hours)

Logical Agents: Knowledge Based Agents, The Wumpus World, Logic and Propositional Logic**.**

Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and Backward chaining, Agents Based on Propositional Logic.

First Order Logic: Representation, Revisited Syntax and Semantics of First Order Logic, Using First Order Logic, Knowledge Engineering in First Order Logic.

Inferences in First Order Logic: Propositional vs. First Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT-3	(15 Hours)

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

Slot and Filler Structures: Semantic Nets, Conceptual Dependency, Scripts.

Planning: Overview - An Example Domain, The Blocks World, Component of Planning Systems, Goal Stack Planning, Hierarchical planning, Reactive systems.

UNIT-4	(15 Hours)

Learning: Introduction to learning, Rote learning, Learning by taking advice, Learning in problem solving, Learning from examples, Induction Learning, Explanation Based Learning.

Expert Systems: Representing and using domain knowledge, Expert system shells, Explanation, Knowledge Acquisition.

Text Books :	1. Stuart Russel and Peter Norvig. Artificial Intelligence - A Modern Approach. Pearson Education, 4 edition, 2020. ISBN 9780134671864 2. Elaine Rich and Kevin Knight. Artificial Intelligence. Tata McGraw-Hill Publishing Company Limited, 2 edition, 2004. ISBN 0-07-460081-8
References :	1. Patrick Henry Winston. Artificial Intelligence. Pearson Education, 3 edition, 2007. ISBN 81317 15051 2. Saroj Kaushik. Artificial Intelligence. CENGAGE Learning, 1 edition, 2020. ISBN 9788131510995.

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ENTERPRISE PROGRAMMING
Job Oriented Elective (Code: JO01)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Object Oriented Programming(20CS303), Web Technologies(20CS402)

Course Objectives: Students will be able to

CO-1	Develop an application using servlets and JDBC.
CO-2	Design an application using JSP and JSF.
CO-3	Create an application on web services and web sockets.
CO-4	Code an enterprise application using EJBs and Persistence API.

Course Learning Outcomes: Students will be able to

CLO-1	Understand steps involved in database connection using JDBC components, Services provided by J2EE. develop web application using cookies and sessions in servlets.
CLO-2	Practice standard and custom tags in JSP and use JSF framework in designing rich user interface.
CLO-3	Design Web Socket Applications and understand about RESTful webservices.
CLO-4	Understand middleware services like multi-threading, Timer Service, Transactions and Asynchronous services in EJB. Understand modern memory concept though JPA.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	POs												PSOs		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	-	2	1	-	2	-	-	-	3	-	2	3	2	3	3
CLO-2	-	-	-	-	2	-	-	-	-	-	-	3	-	-	-
CLO-3	-	2	-	-	-	-	-	-	3	-	-	-	2	-	-
CLO-4	-	-	1	-	-	-	-	-	-	-	2	-	-	3	1

UNIT-1 (15 Hours)

The Big Picture: Java EE Architecture, The Many Variations of Java EE Applications, Packaging and Deploying the Java EE Application, Java EE Platform and Implementations.

Classic Memories - JDBC: Introduction to JDBC, Structured Query Language, The JDBC APIs.

Java Servlets and Web Applications - Foundations of the Web Tier: The HTTP Protocol, Introducing Java Servlets, Understanding the Java Servlet API, Web Applications, Java Servlets: The Good and the Bad.

UNIT-2 (15 Hours)

Dynamic Web Pages - JSP: JSP Runtime Architecture, JSP Syntax, The Java Environment for JSPs, JSP Standard Tags, Custom Tag Libraries, Expression Language.

Assembling Dynamic Web Pages - JavaServer Faces: Architecture of a JSF Application, JavaServer Faces Tags, Java EE Managed Beans, f: Core Tags, JSTL Core Tags, Extensibility and Modularity.	
UNIT-3	(15 Hours)
Web Sites for Non-browsers - JAX-RS: What Are RESTful Web Services, The Java API for RESTful Web Services, Deploying JAX-RS Resources, Content Production, Content Consumption, Accessing Web Service Context, Exception Mapping, Number of Instances of Resource Classes, Path Mapping. **JSON Processing : Streaming API :** Consuming JSON Using the Streaming API, Producing JSON Using the Streaming API; **Object Model API :** Consuming JSON Using the Object Model API , Producing JSON Using the Object Model API. **Adding Sparkle - Java WebSockets:** Introduction to the WebSocket Protocol, The WebSocket Lifecycle, Overview of the Java WebSocket API, Java WebSocket Encoders and Decoders, Message Processing Modes, Path Mapping, Deployment of Server Endpoints.	
UNIT-4	(15 Hours)
The Fundamentals of Enterprise Beans: Introduction to Enterprise Beans, Hello Enterprise Beans, Flavors of Enterprise Beans, Exposing Enterprise Beans, Finding Enterprise Beans, EJB Lifecycle, Packaging Enterprise Beans. **Advanced Thinking with Enterprise Beans:** Multi-threading and Enterprise Beans, Asynchronous Enterprise Beans, Enterprise Bean Contexts, The Timer Service, Transactions and Enterprise Beans, Interceptors. **Modern Memories - The Java Persistence API:** Persistence Entities, The Entity Manager, Java Persistence Query Language, Configuring JPA Applications.	
Text Books :	1. Dr. Danny Coward, "Java EE 7: The Big Picture", oracle press. 2. Arun Gupta "Java EE 7 Essentials" O'Reilly.
References :	Antonio Goncalves "Beginning Java EE 7" apress.

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ENTERPRISE PROGRAMMING LAB
Job Oriented Elective (Code: JOL01)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Object Oriented Programming(20CS303), Web Technologies(20CS402)

Course Objectives: Students will be able to

CO-1	Develop an application using servlets and JDBC.
CO-2	Design an application using JSP and JSF.
CO-3	Create an application on web services and web sockets.
CO-4	Code an enterprise application using EJBs and Persistence API

Course Learning Outcomes: Students will be able to

CLO-1	Develop an application using servlets and JDBC.
CLO-2	Design an application using JSP and JSF.
CLO-3	Create an application on web services and web sockets.
CLO-4	Code an enterprise application using EJBs and Persistence API

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	1	-	2	-	-	-	3	-	2	3	2	3	3	2
CLO-2	2	1	-	2	-	-	-	3	-	2	3	2	3	3	2
CLO-3	2	1	-	2	-	-	-	3	-	2	3	2	3	3	2
CLO-4	2	1	-	2	-	-	-	3	-	2	3	2	3	3	2

LIST OF EXPERIMENTS

1. Write a JDBC application to implement DDL and DML commands.
2. Write an application to demonstrate HTTP Servlets.
3. Write an application to demonstrate cookie & Sessions.
4. Write an application to integrate JSP & Servlets.
5. Write an application to demonstrate custom tags and standard tags in JSP.
6. Write an application to demonstrate JSF validators, event handlers and convertors.
7. Write an application to demonstrate web service.
8. Write a chat application using Web sockets.
9. Write an application to demonstrate Session Bean and Entity Bean (persistence).
10. Write an application to demonstrate Asynchronous and Timer services of Enterprise Bean.

Text Books :	1. Dr. Danny Coward, "Java EE 7: The Big Picture", oracle press. 2. Arun Gupta "Java EE 7 Essentials" O'Reilly.
References :	Antonio Goncalves "Beginning Java EE 7" apress.

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STATISTICS WITH R Job Oriented Elective (Code: JO05)			
Lectures :	**3** Hours/Week	Continuous Assessment :	**30** Marks
Final Exam :	**3** hours	Semester End Exam :	**70** Marks

Pre-Requisite: Mathematical Foundations

Course Objectives: Students will be able to

CO-1	Understand the use of R, Basics of R, Advanced data structures, reading/writing data into R.
CO-2	Understand the basic & advanced data management; manipulate data using SQL statements and visualization of data using different plots.
CO-3	Understand the normal, binomial distributions, correlation and covariance, T-test, ANOVA, Manipulation string, and Linear models.
CO-4	Understand the cluster analysis and classification.

Course Learning Outcomes: Students will be able to

CLO-1	Write mathematical expressions using operator and their precedence's, user defined functions with different types of arguments and they are able to write function documentation.Understand advanced data structures like vectors, lists, matrices, arrays and data.Frame.Import and Export data or datasets from different sources and platforms.
CLO-2	Learn and apply basic and advanced data management skills, different types plotting techniques.
CLO-3	Understand the difference between Supervised and Un-supervised Machine Learning Algorithms.
CLO-4	Learn and apply several clustering machine learning algorithms, classification machine learning algorithms.

	PO's												**PSO's**		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	1	1	1	1	-	-	-	-	-	-	3	1	1	1
CLO-2	2	1	1	1	1	-	-	-	-	-	-	3	1	1	1
CLO-3	2	1	1	1	1	-	-	-	-	-	-	3	1	1	1
CLO-4	2	1	1	1	1	-	-	-	-	-	-	3	1	1	1

UNIT-I	12 Periods

Introduction to R - Why use R?, Obtaining and installing R, The R Environment - Command line interface, RStudio, R Packages - Installing packages, loading packages, Building packages, Basics of R - basic Math, variables, Data types, vectors, calling function, function documentation, missing data.
Advanced Data Structures- data. Frames, Lists, Matrices, Arrays, Reading Data into R-Reading CSVs, Excel data, reading from databases.

UNIT-II	12 Periods

Basic Data Management - A working example, creating new variables, recoding variables, renaming variables, missing values, date values, type conversion, sorting data, merging data set, sub-setting datasets, Using SQL statement to manipulate data.
Advanced Data Management-A data management challenge, Numerical and character functions, a solution for data management challenge, control flow, User Written functions, Aggregate and reshaping
Basic Graphs: Bar plot, pie chart, Histograms, Kernel Density plots, Box plots, dot plots.

UNIT-III	12 Periods

Probability Distributions- Normal distribution, binomial distribution
Basic Statistics: Summary statistics, correlation and covariance, T-test, ANOVA
Manipulating Strings: paste, sprintf, extracting text, regular expression
Linear Models: Simple linear regression, multiple linear regressions.

UNIT-IV	12 Periods

Cluster Analysis-common steps in cluster analysis, calculating distances, Hierarchical cluster analysis, Partitioning cluster analysis
Classifications- logistic regression, decision trees, random forests, support vector machines.

Text Book(s) :	1. R for Every One, Advanced analytics and graphics by Jared P Lander, Addison Wisley Data and Analytics series. (UNIT-I, III). 2. R in Action, Data Analysis and graphics with R, Robert L Kaacoff, Manning Publisher (UNIT-II, IV).
References :	1. Beginning R by Dr.Mark Gardener, Wrox publisher. 2. Associate Analytics Facilitator Guide provided by NASSCOM. 3. http://183.82.43.252/~gopam/html/NASSCOM.

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

STATISTICS WITH R LAB
Job Oriented Elective (Code: JOL05)

Practicals :	**3** Hours/Week	Continuous Assessment :	**30** Marks
Final Exam :	**3** hours	Semester End Exam :	**70** Marks

Pre-Requisite: Mathematical Foundations

Course Learning Outcomes: Students will be able to

CLO-1	Write mathematical expressions using operator and their precedence's, user defined functions with different types of arguments and they are able to write function documentation.Understand advanced data structures like vectors, lists, matrices, arrays and data.Frame.Import and Export data or datasets from different sources and platforms.
CLO-2	Learn and apply basic and advanced data management skills, different types plotting techniques.
CLO-3	Understand the difference between Supervised and Un-supervised Machine Learning Algorithms.
CLO-4	Learn and apply several clustering machine learning algorithms, classification machine learning algorithms.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CLO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO-1	2	1	1	1	1	-	-	-	-	-	-	-	3	1	1
CLO-2	2	1	1	1	1	-	-	-	-	-	-	-	3	1	1
CLO-3	2	1	1	1	1	-	-	-	-	-	-	-	3	1	1
CLO-4	2	1	1	1	1	-	-	-	-	-	-	-	3	1	1

LIST OF EXPERIMENTS

1. a). Write R Code using R as a calculator.
   b). Write R Code on Vector Operation.
   c).Write R code which demonstrate i) Array ii) List iii) Matrix iv) stack v) Data Frames
2. Write R Code to Importing & Exporting data from i)CSV file ii)Excel file
3. Write R code Which Demonstrate i)Missing Value Treatmentii) Outliers
4. Write R code which demonstrate i) Missing Values ii)Date Values iii)Type Conversion
5. Write R code to demonstrate character functions
6. Write R code which demonstrate functions and control loops
7. Write R code which demonstrate SQL operations using R

8. Write R code which demonstrate plotting of graphs i) Histogram ii) PieGraph iii) Plot Graph iv) Box Plot v) Dot Plot vi) Kernel Density Plots
9. Write R code which demonstrate statistics functions i) Mean ii) Median iii) Range iv) Variance v) Co variance
10. Write R Code which demonstrate i) Normal Distribution ii) Binomial Distribution
11. Write R code which demonstrates Linear Regression.
12. Write R code which demonstrate i) T-Test ii) ANOVA test
13. Write R code which demonstrates string operations
14. Write R code for cluster analysis on IRIS data set using i) Hierarchical Clustering ii) Partitioning Clustering (K-Means, K-medoids)
15. Write R code for classification on IRIS data set using i) Decision trees ii) Random Forest iii) Support vector machines

Text Book(s) :	1. R for Everyone, Lander, Pearson. 2. R in Action, Robert Kabacoff, Manning.
References :	1. R Cookbook, Paul Teetor, O'reilly. 2. The Art of R Programming, Norman Matloff, Cengage Learning.