

REPORT ON EXTRACT OF SYLLABUS CHANGE (2017-18 TO 2021-22)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

% Change in syllabus from JNTUA R-15 to AK19 Autonomous Regulations (UG)				
S. No	Course code	Name of the Course	Remarks	% of Syllabus content modified
1	19ABS9901	Algebra & Calculus	New course	100
2	19AHS9901	Communicative English - I	New course	100
3	19ABS9907	Applied Physics Lab	New course	100
4	19ABS9921	Numerical Methods	New course	100
5	19AES0509	Basics of Python Programming	New course	100
6	19AES0104	Basic Civil & Mechanical Engineering	New course	100
7	19AMC9901	Biology for Engineers	New course	100
8	19AES0510	Basics of Python Programming Lab	New course	100
9	19AES0105	Basic Civil & Mechanical Engineering Lab	New course	100
10	19AHS9903	Communicative English II	New course	100
11	19AES0302	Design Thinking & Product Innovation	New course	100
12	19AMC9903	Environmental Studies	New course	100
13	19APR0501	Socially Relevant Project (15 Hrs/Sem)	New course	100
14	19AHS9904	Communicative English II Lab	New course	100
15	19AES0303	Design Thinking & Product Innovation Lab	New course	100
16	19APC0504	Computer Organization Lab	New course	100
17	19APE0417	Sensors and IoT	New course	100
18	19AOE0303	Optimization Techniques	New course	100
19	19APR0502	Socially Relevant Projects (15 Hrs/Sem)	New course	100
20	19APC0521	Artificial Intelligence		70
21	19APC0522	Artificial Intelligence Lab	New course	100
22	19APC0508	Compiler Design Lab	New course	100
23	19APE0506	Big Data Analytics	New course	100
24	19AHEMB02	Entrepreneurship Development	New course	100
25	19APC0216	Neural Networks and Fuzzy Logic	New course	100
26	19APE0413	Cellular and Mobile Communications	New course	100
27	19AMC9902	Constitution of India	New course	100
28	19APR0503	Socially Relevant Projects (15 Hrs/Sem)	New course	100
29	19APC0525	Computer Networks Lab	New course	100
30	19APC0519	Cryptography and Network Security	New course	100
31	19APC0423	Digital Image Processing	New course	100
32	19APE0411	Embedded Systems	New course	100
33	19APE0418	Enabling Technologies For Data Science & Analytics: IoT	New course	100
34	19APE0507	Deep Learning Techniques	New course	100
35	19APE0513	Agile Methodologies	New course	100
36	19APE0514	Adhoc & Sensor Networks	New course	100
37	19APE0511	Natural Language Processing	New course	100
38	19AHE9903	Professional Communication	New course	100
39	19AHE9910	Mathematical Modeling and Simulation	New course	100
40	19AHSMB01	Managerial Economics and Financial Analysis		40
41	19APC0528	Cryptography and Network Security Lab	New course	100
42	19APR0504	Socially Relevant Projects	New course	100

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43	19APR0505	Internship	New course	100
44	19APE0518	Data Analytics with Python	New course	100
45	19APE0519	Data science for Engineers	New course	100
46	19APE0520	Reinforcement Learning	New course	100
47	19AJOE0501	Computer networks and Internet Protocol	New course	100
48	19AJOE0502	Blockchain and its Applications	New course	100
49	19AJOE0503	Model Checking	New course	100
50	19AJOE0504	System and usable security	New course	100
51	19AJOE0505	Introduction to soft computing	New course	100
52	19AJOE0506	Hardware security	New course	100
		<b>Total no. of subjects in R15 of JNTUA syllabus</b>	<b>70</b>	
		<b>No.of subjects with &gt;= 20% change in R15 syllabus</b>	<b>52</b>	
		<b>% of subjects with change in contents</b>	<b>74.28%</b>	

% Change in syllabus from AK19 to AK20 Autonomous Regulations (UG)				
S. No	Course code	Name of the Course	Remarks	% of Syllabus content modified
1	20AES0505	Information Technology & Numerical Methods	New course	100
2	20AES0507	Web Design	New course	100
3	20APC0503	Digital Electronics & Microprocessors	New course	100
4	20ASC0501	Client Side Scripting	New course	100
5	20ASC0502	Server Side Scripting	New course	100
6	20AHS9905	Universal Human Values	New course	100
7	20APC0504	Computer Organization Lab		60
8	20AOE9925	Deterministic & Stochastic Statistical Methods	New course	100
9	20APC0519	Software Engineering	New course	10
10	20APC0520	Software Engineering Lab	New course	100
11	20APC0517	Computer Networks Simulation Lab	New course	100
12	20CSP0501	Community service project	New course	100
		<b>Total no. of subjects in AK19 syllabus</b>	<b>57</b>	
		<b>No.of subjects with &gt;= 20% change in AK19 syllabus</b>	<b>12</b>	
		<b>% of subjects with change in contents</b>	<b>21.05%</b>	

% Change in syllabus from JNTUA R-17 to AK19 Autonomous Regulations (PG)				
S. No	Course code	Name of the Course	Remarks	% of Syllabus content modified
1	19MBA0110	Research Methodology and IPR	New Course	
2	19DPE0502	Advanced Computer Networks	New Course	
3	19DPE0503	Artificial Neural Networks	New Course	
4	19DMC9901	English for Research Paper Writing	New Course	
5	19DMC0101	Disaster Management	New Course	
6	19DMC9902	Sanskrit for Technical Knowledge	New Course	
7	19DMC9903	Value Education	New Course	
8	19AMC9904	Constitution of India	New Course	



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9	19DMC5801	Pedagogy Studies	New Course	
10	19DMC9905	Stress Management by Yoga	New Course	
11	19DMC9906	Personality Development through Life Enlightenment Skills	New Course	
12	19DPR5801	Mini Project with Seminar	New Course	
13	19DPE5813	Data Preparation and Analysis	New Course	
14	19DPE5814	Secure Software Design & Enterprise Computing	New Course	
15	19DPE5815	Computer Vision	New Course	
16	19DOE9001	Industrial Safety	New Course	
17	19DOE5801	Business Analytics	New Course	
18	19DOE9002	Operations Research	New Course	
19	19DOE2002	Project Management	New Course	
20	19DOE2001	Waste to Energy	New Course	
21	19DOE9004	Composite Materials	New Course	
22	19DPR5802	Dissertation-I /Industrial Project	New Course	
23	19DPR5803	Dissertation II	New Course	
		<b>Total no. of subjects in R17 syllabus</b>	<b>23</b>	
		<b>No.of subjects with &gt;= 20% change in R17 syllabus</b>	<b>23</b>	
		<b>% of subjects with change in contents</b>	<b>100%</b>	

% Change in syllabus from AK19 to AK22 Autonomous Regulations (PG)				
S. No	Course code	Name of the Course	Remarks	% of Syllabus content modified
1	22DPR5802	Dissertation Phase – 1	New Course	100
2	22DPR5803	Co-curricular Activities	New Course	100
3	22DPR5804	Dissertation Phase – 2	New Course	100
		<b>Total no. of subjects in AK19 syllabus</b>	<b>21</b>	
		<b>No.of subjects with &gt;= 20% change in AK19 syllabus</b>	<b>3</b>	
		<b>% of subjects with change in contents</b>	<b>14.28%</b>	

#### Reasons for introducing new programmes and Change/Revision of Syllabus:

The following are the reasons that new UG Programmes (Artificial Intelligence and Data Science, IOT and Cyber Security including Block chain Technology, Artificial Intelligence and Machine learning and Data Science) are introduced and new courses have been included.

**Technological advancements:** Computer science and engineering are rapidly evolving fields, and new technologies are constantly being developed. As a result, new courses and subjects need to be added to keep up with the latest trends and prepare students for future job opportunities.

**Industry demand:** The demand for skilled computer science and engineering professionals is on the rise, and many industries are seeking graduates with specialized skills in areas such as cyber security, data science, machine learning and artificial intelligence. Therefore, computer science and engineering departments need to introduce new courses and subjects to meet this demand.

  
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**Interdisciplinary collaboration:** Computer science and engineering are increasingly being integrated with other fields, such as medicine, business, and finance. Therefore, new courses and subjects need to be added to facilitate interdisciplinary collaboration and prepare students for careers that require a combination of technical and non-technical skills.

**Student interests:** Student interests and career goals are also important factors in determining which courses and subjects are included in computer science and engineering departments. As students become more interested in certain areas, such as game development or data science, computer science and engineering departments may introduce new courses to cater to these interests.

As a result, the above mentioned new courses are introduced in AK19 and AK20 regulation and few subjects have been revised with latest techniques.

  
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**B.Tech II Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AES0509	Basics of Python Programming	2	0	0	2

**Course Objectives:**

- To learn the fundamentals of Python
- To elucidate problem solving using a Python programming language
- To introduce a function oriented programming paradigm through python
- To get training in the development of solutions using modular concepts
- To introduce the programming constructs of python

**Unit – I**

Introduction: What is a program, Running python, Arithmetic operators, Value and Types.

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.  
 Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

**Unit – II**

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.  
 Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.  
 Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types.

**Unit – III**

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

**Unit – IV**

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

**Unit – V**

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The \_\_str\_\_ method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args.

**Course Outcomes:**

Student should be able to

1. Apply the features of Python language in various real applications.
2. Select appropriate data structure of Python for solving a problem.
3. Design object oriented programs using Python for solving real-world problems.
4. Apply modularity to programs.

**Text books:**

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.

**Reference Books:**

1. Martin C. Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.4	1.4.1
CO2	PO2: Problem Analysis	2.3	2.3.1
CO3	PO2: Problem Analysis	2.4	2.4.2
CO4	PO2: Problem Analysis	2.2	2.2.3

  
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**B.Tech II Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AES0104	Basic Civil & Mechanical Engineering	3	0	0	3

**Course Outcomes:**

- CO 1 understand principles of Stress and Strain
- CO 2 understand basic principles of Strain Measurement and apply the concepts of Strain Rosettes for strain measurement.
- CO 3 understand common building materials used in construction and analyze characteristics of common building materials.
- CO 4 Apply velocity ratio concepts in power transmission.
- CO 5 Understand the principles of CAD, CAM & CIM

**PART - A**

**UNIT - I:**

Basic Definitions of Force – Stress – Strain – Elasticity, Shear force – Bending Moment – Torsion. Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

**UNIT - II:**

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges - multi channel strain indicators. Rosette analysis - Rectangular and Triangular strain rosettes - Wheatstone bridge.

**UNIT - III:**

Characteristics of common building materials - Brick - Types - Testing; Timber - Classification - Seasoning - Defects in Timber; Glass - Classification - uses; steel and its applications in Construction Industry.

**PART - B**

**UNIT - IV: Power Plants**

Classification of Power plants – Steam Power Plants – Nuclear Power Plants – Gas turbines – Hydro Power Plants – Solar energy – wind energy – Tidal Power – Geo Thermal Power.

**UNIT - V: Transmission of Power**

Transmission of Power – Belt and Rope Drives – Types of Belts – Materials – Velocity ratio – Speed Ratio – Rope Drives – V-Belt – Flat Belt.

**UNIT - VI: Computer Aided Design & Manufacturing**

Introduction to engineering applications of computer aided design – Computer Aided Drawing – Advantages of CAD – Computer Aided Manufacturing – Functions of Robots in manufacturing Applications – advantages of Robots – Computer integrated Manufacturing (CIM).

**Text Books:**

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi.
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd.

**References:**

1. S.Trymbaka Murthy., "Computer Aided Engineering Drawing", Universities Press
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam.
4. Er. R. Vaishnavi, Basic Civil and Mechanical Engineering, 2/e, S. Chand Publications

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO2	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2
		2.3	2.3.1
CO3	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO 4	PO1: Engineering knowledge	1.2	1.2.1

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**B.Tech II Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AMC9901	Biology for Engineers	2	0	0	0

**Course Outcomes**

- CO 1 Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- CO 2 Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
- CO 3 Brief about human physiology.
- CO 4 Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- CO 5 Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals

**UNIT I**

Evolution. Different patterns of evolution, Darwin's theory of evolution, Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification, Tissue Engineering.

**UNIT II**

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

**UNIT III**

Digestive system, Respiratory system, (aerobic and anaerobic Respiration), Respiratory organs, respiratory cycle, Central Nerves System and Excretory system.

**UNIT IV**

Prokaryotic gene and Eukaryotic gene structure, DNA replication, Transcription and Translation, DNA technology, introduction to gene cloning.

**UNIT V**

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, Properties and Classification of virus, Immune response to virus, Definitions-Pandemic, Epidemic and outbreak, pandemic alert system ranges, Prevention of pandemic disease and pandemic preparation.


**TEXT BOOKS :**

1. P.K.Gupta, Cell and Molecular Biology, 5<sup>th</sup> Edition, Rastogi Publications.
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017.

**REFERENCE BOOKS :**

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T.Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mcennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014.
6. Richard Dawkins, River Out of Eden: A Darwinian View of Life Fluid Mechanics and Machinery by D.RamaDurgaiah, New Age International.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1:Apply the knowledge of basic science	1.2	1.2.1
CO: 2	PO1:Apply the knowledge of basic science	1.2	1.2.1
CO: 3	PO1:Apply the knowledge of basic science	1.2	1.2.1
CO: 4	PO1:Apply the knowledge of basic science	1.2	1.2.1
CO: 5	PO1:Apply the knowledge of basic science	1.2	1.2.1

  
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**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AES0302	Design Thinking and Product Innovation	2	0	0	2

Course Objectives:

- To familiarize product design process
- To introduce the basics of design thinking
- To bring awareness on idea generation
- To familiarize the role of design thinking in services design

Unit - I

Introduction to design, characteristics of successful product development, product development process, identification of opportunities, product planning, Innovation in product development.

Unit - II

Design thinking: Introduction, Principles, the process, Innovation in design thinking, benefits of Design thinking, design thinking and innovation, case studies.

Unit - III

Idea generation: Introduction, techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Synectics, etc., Select ideas from ideation methods, case studies.

Unit - IV

Design Thinking in Information Technology, Design thinking in Business process model, Design thinking for agile software development, virtual collaboration, multi user and multi account interaction, need for communication, TILES toolkit, Cloud implementation.

Unit - V

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

Course Outcomes: Student should be able to

1. Generate and develop different design ideas.
2. Appreciate the innovation and benefits of design thinking.
3. Experience the design thinking process in IT and agile software development.
4. Understand design techniques related to variety of software services

Reference Books:

1. Christoph Meinel and Larry Leifer, "Design Thinking", Springer, 2011
2. Aders Riise Maehlum, "Extending the TILES Toolkit" from Ideation to Prototyping
3. <http://www.algarytm.com/it-executives-guide-to-design-thinking/e-book>.
4. Marc stuckdorn and Jacob Schneider, "This is Service Design Thinking", Wiley, 2011
5. Pahl and Vietz, "Engineering Design", Springer, 2007

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO3: Design/development of solutions	3.1	3.1.1
CO: 2	PO 1: Engineering knowledge	1.3	1.3.1
CO: 3	PO 1: Engineering knowledge	1.3	1.3.1
CO: 4	PO3: Design/development of solutions	3.1	3.1.1
CO: 5	PO 1: Engineering knowledge	1.3	1.3.1

  
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**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AMC9903	Environmental Studies	2	0	0	0

**Course Outcomes:**

- CO: 1 Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
- CO: 2 Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self-learning.
- CO: 3 Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- CO: 4 Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
- CO: 5 To get knowledge on various environmental acts and to engage all the students life long learning of rain water harvesting

**UNIT I**

**Multidisciplinary Nature of Environmental Studies:** Introduction – Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance – Need for Public Awareness.

**Natural Resources:** Renewable and non-renewable energy resources – Natural resources and associated problems.

**Forest resources:** Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

**Water resources:** Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

**Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

**Energy resources:** Renewable and non-renewable energy resources

**UNIT II**

**Ecosystems:** Concept of an ecosystem. – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**Biodiversity And Its Conservation :** Introduction- Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**UNIT III**

**Environmental Pollution:** Definition, Causes, effects and its control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone, Tsunami and landslides.

**UNIT IV**

**Social Issues and the Environment:** From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people – Case studies –

**Environmental ethics:** Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies–Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Public awareness.

**UNIT V**

**Human Population and the Environment:** Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

**Text Books:**

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.
3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd.

  
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**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0504	Computer Organization Lab	0	0	2	1

**Course Objectives:**

1. Understanding the behavior of logic gates ,adders, decoders, multiplexers and flipflops.
2. Understanding the behavior of ALU, RAM,STACK and PROCESSOR from working modules and the modules designed by the student as part of the experiment.

**Exercises in Digital Logic Design:**

- Implement Logic gates using NAND and NOR gates
- Design a Full adder using gates
- Design and implement the 4:1 MUX, 8:1 MUX using gates /ICs.
- Design and Implement a 3 to 8 decoder using gates
- Design a 4 bit comparator using gates/IC
- Design and Implement a 4 bit shift register using Flip flops
- Design and Implement a Decade counter

**Exercises in Micro Processor programming:**

Write assembly language programs for the following using GNU Assembler.

1. Write assembly language programs to evaluate the expressions:

i)  $a = b + c - d * e$

ii)  $z = x * y + w - v + u / k$

a. Considering 8-bit, 16 bit and 32 bit binary numbers as b, c, d, e.

b. Considering 2 digit, 4 digit and 8 digit BCD numbers.

Take the input in consecutive memory locations and also Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

2. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

a. Arrange in ascending and descending order.

3. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

a. Find max and minimum

b. Find average

Considering 8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

**REFERENCE BOOKS:**

- Switching theory and logic design –A. Anand Kumar PHI, 2013
- Advanced microprocessor & Peripherals-A. K. Ray and K. M. Bherchandavi, TMH, 2nd edition.
- Switching and Finite Automatic theory-Zvi Kohavi, Niraj K.Jha Cambridge, 3rd edition
- Digital Design –Morris Mano, PHI, 3rd edition
- Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

**Course Outcomes:**

- Represent numbers and perform arithmetic operations.
- Minimize the Boolean expression using Boolean algebra and design it using logic gates
- Analyse and design combinational circuit.
- Design and develop sequential circuits
- Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
CO3	PO2: Problem analysis	2.3	2.3.1
CO4	PO 3: Design/Development of Solutions	3.4	3.4.3
CO5	PO1: Engineering knowledge	1.4	1.4.1

  
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**B.Tech III Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0521	ARTIFICIAL INTELLIGENCE	3	0	0	3

**Course Objectives:**

- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

**Course Outcomes:**

- Apply searching techniques for solving a problem
- Design Intelligent Agents
- Develop Natural Language Interface for Machines
- Design mini robots
- Summarize past, present and future of Artificial Intelligence

**UNIT I**

**Introduction** What is AI, Foundations of AI, History of AI, The State of Art.

**Intelligent Agents:** Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

**UNIT II**

**Solving Problems by searching:** Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**UNIT III**

**Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL

**Natural Language Processing:** Language Models, Text Classification, Information Retrieval, Information Extraction.

**UNIT IV**

**Natural Language for Communication:** Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic interpretation, Machine Translation, Speech Recognition

**Perception:** Image Formation, Early image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

**UNIT V**

**Robotics:** Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains

**Philosophical foundations:** Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

**Textbook:**

1. Stuart J. Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3<sup>rd</sup> Edition, Pearson Education, 2019.

**References:**

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2. Problem Analysis	2.2	2.2.3
CO2	PO3 Design/development of solutions	3.3	3.3.1
CO3	PO5. Modern tool usage	5.1	5.1.1
CO4	PO3. Design/development of solutions	3.4	3.4.1
CO5	PO12. Life-long learning	12.3	12.3.2

  
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**B.Tech III Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APCO522	ARTIFICIAL INTELLIGENCE LABORATORY	0	0	3	1.5

**Course Objectives:**

This course is designed to:

- Explore the methods of implementing algorithms using artificial intelligence techniques
- Illustrate search algorithms
- Demonstrate building of intelligent agents

**Course Outcomes:**

Up on the completion of Course, The student will be able to

- Implement search algorithms
- Solve Artificial Intelligence Problems
- Design Chatbot
- Implement Text Classification

List of Experiments to be implemented in Java/Python

1. Write a Program to Implement BFS and DFS.
2. Write a Program to find the solution for travelling sales person problem.
3. Write a program to implement simulated annealing Algorithm.
4. Write a Program to Implement Tic-Tac-Toe game.
5. Write a Program to Implement 8-Puzzle problem.
6. Write a program to implement Towers of Hanoi problem.
7. Write a program to implement A\* Algorithm.
8. Write a Program to Implement Water-Jug problem.
9. Write a program to implement Hangman game.
10. Write a program to solve N Queen problem using backtracking.
11. Generate Calendar for the given month and year using a python program.
12. Write a program to implement simple Chatbot.
13. Write a program to remove stop words for a given passage from a text file using NLTK.
14. Write a program to implement stemming for a given sentence using NLTK.
15. Write a program to POS (Parts of Speech) tagging for the give sentence using NLTK.
16. Write a program to implement Lemmatization using NLTK.

**References:**

1	Tensorflow: <a href="https://www.tensorflow.org/">https://www.tensorflow.org/</a>
2	Pytorch: <a href="https://pytorch.org/">https://pytorch.org/</a> , <a href="https://github.com/pytorch">https://github.com/pytorch</a>
3	Theano: <a href="http://deeplearning.net/software/theano/">http://deeplearning.net/software/theano/</a> <a href="https://github.com/Theano/Theano">https://github.com/Theano/Theano</a>
4	<a href="https://www.nltk.org/">https://www.nltk.org/</a>

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO3. Design/development of solutions	3.2	3.2.1
CO2	PO4. Conduct investigations of complex problems	4.2	4.2.1
CO3	PO5. Modern tool usage	5.2	5.2.1
CO4	PO5. Modern tool usage	5.1	5.1.2

  
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**B.Tech III Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AHEM02	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3

**Course Outcomes:**

- Understand the concept of Entrepreneurship and challenges in the world of Competition.
- Apply the Knowledge in generating ideas for New Ventures and design business plan structure.
- Analyze various sources of finance and subsidies to entrepreneurs.
- Evaluate the role of central government and state government in promoting women Entrepreneurship.
- Study the role of incubations in fostering startups.

**UNIT-I : Introduction to Entrepreneurship**

Entrepreneurship Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

**UNIT - II: Formulation of Business Idea**

Starting the New Venture - Generating business idea - Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

**UNIT - III: Financial Aspects of Promotion**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance - Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development.

**UNIT - IV: Women Entrepreneurship**

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants - Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

**UNIT - V: Startups and Incubation**

Startups - Definition, Role of startups in India, Governmental initiatives to foster entrepreneurship across sectors, Funding opportunities for startups. Business Incubation and its benefits, Pre-Incubation and Post - Incubation process.

**Textbooks:**

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective - Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : [login.cengage.com](http://login.cengage.com))
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013.

**Reference Books:**

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2<sup>nd</sup> Edition, Oxford, 2012.
3. B.Janakiram and M.Rizwanaj "Entrepreneurship Development: Text & Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

**Online Learning Resources:**

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
3. [http://nptel.ac.in/courses/122106032/Pdf/7\\_4.pdf](http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf)
4. <http://freevideolectures.com/Course/3514/Economics/-/Management/-/Entrepreneurship/50>

List of Cos	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.2 1.3	1.2.1 1.3.1
CO2	PO3: Design/Development of Solutions	3.2	3.2.1 3.2.2
CO3	PO11: Project management and finance	11.2	11.2.1
CO4	PO6: The engineer and society	6.2	6.2.1
CO5	PO3: Design/Development of Solutions	3.3	3.2.2

  
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**B.Tech III Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0413	CELLULAR AND MOBILE COMMUNICATIONS	3	0	0	3

**Course Outcomes:**

Upon completion of the course students will be able to

**CO1:** understand impairments due to multipath fading channel.

**CO2:** Understand the fundamental techniques to overcome the different fading effects

**CO3:** To understand Co channel and Non Co channel interferences

**CO4:** Able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.

**CO5:** Understanding of frequency management, channel assignment and types of handoff

**UNIT I:**

**CELLULAR MOBILE RADIO SYSTEMS:** Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

**ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN:** General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, re-consideration of the components of cellular system.

**UNIT II:**

**INTERFERENCE:** Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

**UNIT III:**

**CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

**UNIT IV:**

**CELL SITE AND MOBILE ANTENNAS:** Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

**FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:** Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

**UNIT V:**

**HANDOFF:** Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff, Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

**DIGITAL CELLULAR NETWORKS:** GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

**TEXT BOOKS:**

1. Mobile cellular telecommunications-W .C. Y. Lee, Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Wireless communications-Theodore. S. Rappoport, Pearson Education, 2<sup>nd</sup> Edn., 2002.

**REFERENCES:**

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, Persons Education, 2005.
3. Wireless Communication theory and Techniques, Asrar U.H .Sheikh ,Springer, 2004.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO2. Problem Analysis	2.2	2.2.2
CO3	PO2. Problem Analysis	2.2	2.2.2
CO4	PO1. Engineering knowledge	1.4	1.4.1
CO5	PO5. Modern tool usage	5.1	5.1.1

  
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**B.Tech III Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AMC9902	Constitution Of India	2	0	0	0

**Course Outcome:**

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the Powers and functions of Governor, President, and Judiciary.
5. Discuss the functions of local administration bodies

**UNIT - I**

History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working).

**UNIT - II**

Philosophy of the Indian Constitution - Preamble Salient Features

**UNIT - III**

Contours of Constitutional Rights & Duties - Fundamental Rights - Right to Equality- Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.

**UNIT - IV**

Organs of Governance - Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive •President •Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions

**UNIT - V**

Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation- Panchayati raj: Introduction, PRI: Zilla Panchayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

**Suggested books for reading:**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1		6.2	6.2.1
CO2		6.2	6.2.1
CO3		6.2	6.2.1
CO4		6.2	6.2.1
CO5		6.2	6.1.1

  
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**B.Tech IV Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0519	CRYPTOGRAPHY AND NETWORK SECURITY	2	0	0	2

**Course Objectives:**

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public key cryptosystem.
- Describe the enhancements made to IPv4 by IPsec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss Web security and Firewalls

**Course Outcomes:**

CO1:	Understand basic Cryptographic algorithm, Security issues
CO2:	Identify various type of vulnerabilities of a computer network
CO3:	Outline various Security algorithms.
CO4:	Design secure system
CO5:	Investigate the threads and identify the solution for the threats

**Mapping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	2												
CO3	2	3												2
CO4	3		2											
CO5	3			3									3	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

**UNIT - I**

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

**UNIT - II**

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution

**UNIT - III**

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

**UNIT - IV**

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

**UNIT - V**

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls. Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

**TEXT BOOKS:**

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011.
2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Mc Graw Hill, 2010.
3. Bernard Menezes "Network Security and Cryptography", 1st Edition, CENGAGE Learning, 2010.

**REFERENCES:**

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

  
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B.Tech IV Year I Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0418	Enabling Technologies for Data Science & Analytics: IoT	3	0	0	3

**Course objectives:**

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IoT Devices.

**Course Outcomes:**

CO1:	Able to understand the applications of IOT
CO2:	Able to understand build blocks of IOT
CO3:	Apply IOT design methodologies
CO4:	Able to understand the HADOOP and IEEE standard protocol
CO5:	Able to understand the Zigbee devices

**Mapping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			2					2			1	
CO2	3	3			2					2			1	
CO3	3	3	2			2	2							1
CO4	3	3	2	2										1
CO5	3				2	2				2			1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

**UNIT I: Introduction to Internet of Things**

Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, Domain Specific IoTs Introduction, Home Automation, cities, Environment, Retail, Agriculture, Industry, Health & Lifestyle.

**UNIT II: IoT and M2M**

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT System Management with NETCONF-YANG Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator requirements, NETCONF, YANG, IoT System Management with NETCONF-YANG.

**UNIT III: Developing Internet of Things**

Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Case Studies Illustrating IoT Design: Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

**UNIT IV: Advanced Topics:**

Introduction, Apache Hadoop, Using Hadoop Map Reduce for Batch Data Analysis, IEEE 802.15.4: The IEEE 802 committee family of protocols, The physical layer, The Media Access control layer, Uses of 802.15.4, The Future of 802.15.4: 802.15.4c and 802.15.4g.

**UNIT V: ZigBee:**

Development of the standard, ZigBee Architecture, Association, The ZigBee network layer, The ZigBee APS Layer, The ZigBee Devices Object (ZDO) and the ZigBee Device Profile (ZDP), ZigBee Security, The ZigBee Cluster Library (ZCL), ZigBee Applications profiles, The ZigBee Gateway Specifications for network devices.

**TEXT BOOKS:**

1. Internet of Things a Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. University Press.
2. The Internet of Things key applications and protocols by Oliver Hersent, David Boswarthick and Omar elloumi, Wiley Student Edition.

**REFERENCES:**

1. Internet of Things: Architecture, Design Principles and Applications by Raj Kamal MCGraw Hill Edition.

  
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B.Tech IV Year I Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0507	Deep Learning Techniques	3	0	0	3

**Course Objectives:**

After completion of the course, students will be able to

- Learn deep learning methods for working with sequential data.
- Learn deep recurrent and memory networks.
- Learn deep Turing machines.
- Apply such deep learning mechanisms to various learning problems.
- Know the open issues in deep learning, and have a grasp of the current research directions.

**Course Outcomes:**

CO1:	Demonstrate an understanding of statistics and machine learning concepts
CO2:	Demonstrate the basic concepts fundamental learning techniques and layers.
CO3:	Discuss the Neural Network training, various random models.
CO4:	Explain different types of deep learning network models.
CO5:	Classify the Probabilistic Neural Networks.

**Mapping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2		3		2							3	
CO2	2		3	1										
CO3	3	3	3	1										
CO4	2	2	1	3		1		1						
CO5	1	3	2	2				1						

[Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High]

**UNIT - I**

**A Review of Machine Learning:** The Learning Machines, The Math Behind Machine Learning: Linear Algebra, The Math Behind Machine Learning: Statistics, How Does Machine Learning Work?, Logistic Regression, The Logistic Function, Evaluating Models, Building an Understanding of Machine Learning

**UNIT - II**

**Foundations of Neural Networks and Deep Learning :** Neural Networks: Biological Neuron, Perceptron, Multi Layer Perceptron, Training Neural Networks: Back-propagation, Activation Functions, Loss Function, Hyper-parameters.

**UNIT - III**

**Fundamentals of Deep Learning:** Definition of Deep Learning, Common Architecture Principles of Deep Networks, Building Blocks of Deep Learning.

**Architectures of Deep Learning:** Unsupervised Pre trained Networks, Convolution Neural Networks (CNN's), Recurrent Neural Networks, and Recursive Neural Networks

**UNIT - IV**

**Deep Learning Research:** Linear factor models: Probabilistic PCA And Factor Analysis, Independent Component Analysis, Sparse Coding, Manifold Interpretation of PCA, Auto Encoders: Regularized Autoencoders, Representational Power, Layer Size and Depth, Denoising Autoencoders, Applications of Autoencoders.

**UNIT - V**

**Deep Generating Models:** Boltzmann Machines, Restricted Boltzmann Machines, Deep Belief Networks, Deep Boltzmann Machines, Convolution Boltzmann Machines, Backpropagation through Random Operations, Directed Generative Nets, Generating Static Networks.

**Applications:** Large Scale Deep Learning, Image Recognition, Speech Recognition, Natural Language Processing, Other Applications.

**Text Books:**

1. Deep Learning A practitioner's approach- josh Patterson and Adam Gibson, OREILLY.
2. Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016.

**References:**

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G., H., and Van Loan, C., F, JHU Press, 2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.
4. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.

  
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**B.Tech IV Year I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AHSMB01	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	2	0	0	2

**Course Objectives:**

- To understand the concepts of managerial economics and financial analysis this helps in optimal decision making in business environment.
- To be familiar with demand concepts, types of methods or techniques of demand those are used by the entrepreneur or producer.
- To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production.
- To introduce the concepts of cost and significance, limitation of Break even analysis.
- To provide the optimal decisions acquiring the knowledge on financial accounting and its analysis

**Course Outcomes:**

CO1:	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
CO2:	Apply the Concept of Production cost and revenues for effective Business decision
CO3:	Analyze how to invest their capital and maximize returns.
CO4:	Evaluate the capital budgeting techniques.
CO5:	Define the concepts related to financial accounting and management and able to develop the Accounting statements and evaluate the financial performance of business entity.

**Mapping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3						1				1			
CO2	1	2												
CO3	2					1								
CO4											3			
CO5				2							2			

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

**UNIT - I**

Introduction – meaning, nature, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.

**UNIT - II**

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

**UNIT - III**

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

**UNIT - IV**

Introduction to Capital, Sources of Capital. Short-term and Long-term Capital : Working capital, types, Estimating Working capital requirements. Capital Budgeting – Features, Proposals, Time value of money. Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), and Internal Rate Return (IRR) Method (simple problems).

**UNIT - V**

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). **Financial Analysis** - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

**Text Books:**

- Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
- Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

**Reference Books:**

- Ahuja HI Managerial economics Schand,3/e,2013
- S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
- Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
- Domnick Salvatore: Managerial Economics in a Global Economy, Cengage. 2013.

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M.Tech I Semester

(19DMC9901) ENGLISH FOR RESEARCH PAPER WRITING

L	T	P	C
2	0	0	0

**Course Outcomes:** At the end of the course, students will be able to

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Develop writing skill
5. Able to quote phrases

**UNIT – I**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

**UNIT – II**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

**UNIT – III**

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

**UNIT – IV**


Skill needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

**UNIT -V**

Useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

**REFERENCES:**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

  
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M.Tech I Semester

(19DMC0101) DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

**Course Outcomes:** At the end of the course, students will be able to

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

**UNIT – I**

Introduction: Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude. Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

**UNIT – II**

Disaster Prone Areas in India Study Of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

**UNIT – III**

Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other Agencies, Media Reports: Governmental and Community Preparedness.

**UNIT – IV**

Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation, Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment, Strategies for Survival.

**UNIT -V**

Disaster Mitigation Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation, Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

**REFERENCES:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies" New Royal book Company.
2. Sahni, Pardeep et.al. (Eds.), "Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. I., "Disaster Administration And Management Text And Case Studies" ,Deep&Deep Publication Pvt. Ltd., New Delhi.

  
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M.Tech I Semester

(19DMC9903) VALUE EDUCATION

L	T	P	C
2	0	0	0

**Course Outcomes:** At the end of the course, students will be able to

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character
4. Learn the importance of Human values
5. Developing the overall personality

**UNIT – I**

Values and self-development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgments

**UNIT – II**

Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline

**UNIT – III**

Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Order, Introduction of roots

**UNIT – IV**

Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature

**UNIT -V**

Character and Competence –Holy books vs. Blind faith, Self-management and Good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, studying effectively

**REFERENCES:**

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

  
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(19DMC5801) PEDAGOGY STUDIES

L	T	P	C
2	0	0	0

**UNIT – I**

**Introduction and Methodology:**

Aims and rationale, Policy background, Conceptual framework and, terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions, Overview of methodology and Searching.

**UNIT II**

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

**UNIT III**

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change, Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

**UNIT IV**

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

**UNIT V**

Research gaps and future directions, Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

**References:**

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeamong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeamong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. [www.pratham.org/images/resource%20working%20paper%202.pdf](http://www.pratham.org/images/resource%20working%20paper%202.pdf).

  
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M.Tech II Semester

**(19DMC9905) STRESS MANAGEMENT BY YOGA**

L	T	P	C
2	0	0	0

**Course Outcomes:** At the end of the course, students will be able to

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency
3. To achieve overall health of body and mind
4. To overcome stress
5. Identify critical evidence gaps to guide the development.

**UNIT – I**

Definitions of Eight parts of yoga ( Ashtanga )

**UNIT – II**

Yam and Niyam, Ahinsa, satya, astheya, bramhacharya and aparigraha

**UNIT – III**

Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

**UNIT – IV**


Asan and Pranayam: Various yoga poses and their benefits for mind & body

**UNIT -V**

Regularization of breathing techniques and its effects-Types of pranayam

**REFERENCES:**

1. "Yogic Asanas for Group Training-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

  
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(19DMC9906) PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L	T	P	C
2	0	0	0

**Course Outcomes:** At the end of the course, students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Nectishatakam will help in developing versatile personality of students.
4. To become a person with stable mind, pleasing personality and determination
5. To awaken wisdom in students

**UNIT – I**

Neetisatakam-Holistic development of personality

1. Verses- 19,20,21,22 (wisdom)
2. Verses- 29,31,32 (pride & heroism)
3. Verses- 26,28,63,65 (virtue)
4. Verses- 52,53,59 (don't's)
5. Verses- 71,73,75,78 (do's)

**UNIT – II**

1. Approach to day to day work and duties.
2. Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48.

**UNIT – III**

1. Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
2. Chapter 18-Verses 45, 46, 48.

**UNIT – IV**


1. Statements of basic knowledge.
2. Shrimad Bhagwad Geeta: Chapter 2-Verses 56, 62, 68
3. Chapter 12 -Verses 13, 14, 15, 16,17,18

**UNIT -V**

1. Personality of Role model.
2. Shrimad Bhagwad Geeta: Chapter 2-Verses 17, Chapter 3-Verses 36,37,42,
3. Chapter 4-Verses 18, 38,39
4. Chapter 18 – Verses 37,38,63

**REFERENCES:**

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

  
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