1.1.3_CE_file no:2 – ExtractFromSyllabusBook

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: TIRUPATI

Year I	Semester I		Branch of Study: Common to All	

Subject Code 19AHS9902	Subject Name **Communicative English I Lab.**	L 0	T 0	P 3	Credits:1.5

Course Outcomes:

CO1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills

CO2: Apply communication skills through various language learning activities.

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings.

CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1
1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Unit 2
1. JAM
2. Small talks on general topics
3. Debates

Unit 3
1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Unit4
1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Unit 5
1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

List of COs	PO No. and keyword	Competency	Performance Indicator
CO 1	PO10: Communication	10.2	10.1.1
CO 2	PO10: Communication	10.3	10.3.1
CO 3	PO10: Communication	10.2	10.2.1
CO 4	PO 9: Individual & Team Work	9.2	9.2.1
CO 5	PO10: Communication	10.2	10.2.1

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Year : I   **Semester : I**   **Branch of Study : Common to All**

Subject Code: 19AES0503	Subject Name: Problem Solving and Programming Lab	L T P 0 0 3	Credits: 1.5

Course outcomes: Student should be able to
1. Create interactive visual programs using Scratch.
2. Develop flowcharts using raptor to solve the given problems.
3. Develop Python programs for numerical and text based problems
4. Develop graphics and event based programming using Python
5. Develop Python programs using beautiful Pythonic idiomatic practices

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
4. Construct flowcharts to
   a. calculate the maximum, minimum and average of N numbers
   b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
5. Construct flowcharts with separate procedures to
   a. calculate simple and compound interest for various parameters specified by the user
   b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
6. Construct flowcharts with procedures to
   a. generate first N numbers in the Fibonacci series
   b. generate N Prime numbers
7. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
8. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
9. Design a flowchart to determine the number of characters and lines in a text file specified by the user
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \leq YYYY \leq 9999$, $1 \leq MM \leq 12$, $1 \leq DD \leq 31$) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 \leq HH \leq 23$, $0 \leq MM \leq 59$, $0 \leq SS \leq 59$)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words

18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
23. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

Text Book:
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO3: Design/Development of Solutions	3.1	3.1.4
CO2	PO3: Design/Development of Solutions	3.1	3.1.4
CO3	PO2: Problem analysis	2.2	2.2.2
CO4	PO2: Problem analysis	2.2	2.2.2
	PO3: Design/Development of Solutions	3.1	3.1.4
CO5	PO3: Design/Development of Solutions	3.1	3.1.4

Year I	Semester II	Branch of Study: Common to All		

19AES0504	Data Structures Lab	L T P 2 1 0	Credits: 3

Course Outcomes:

6. Understand the importance of AI and concepts of Machine Learning algorithms and their limitations.
7. Develop Chatbots based on the requirements.
8. Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression.

Experiments:

1. Supervisely - Perform Data Labelling for various images using object recognition
   Experiment Outcomes:
   - Understand supervised learning for various datasets of images using Pattern Recognition.
2. Lobe.ai - Build custom models using the visual tool for Object recognition and sentiment analysis that can convert facial expressions into emoticons
   Experiment Outcomes:
   - Manage image databases using detection tools for classification.
   - Build different applications using Image Processing & Computer Vision.

3. Teachable Machine - In Browser Object Recognition through Brain.JS
   Experiment Outcomes:
   - Understand Image Recognition through Brain.JS
4. Liv.ai - App for Speech recognition and Synthesis through APIs
   Experiment Outcomes:
   - Summarize applications of Speech Recognition and Synthesis.

5. Building a Chatbot using AWS Lex, Pandora bots
   Experiment Outcomes:
   - Develop bots, chatbots, audiobots, music bots

6. Configure an existing Neural Network by manipulating various parameters involved
   Experiment Outcomes:
   - Understand different Neural Networks by various parameters.

7. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
   Experiment Outcomes:
   - Build an AI Assistant with Wolfram Alpha and Wikipedia in Python

8. Build a Convolutional Neural Network for Cat vs Dog Image Classification
   Experiment Outcomes:
   - Build CNN for different images Classification

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References :

Pytorch:
> https://pytorch.org/
> https://github.com/pytorch

Keras:
> https://keras.io/
> https://github.com/keras-team

Theano:
> http://deeplearning.net/software/theano/
> https://github.com/Theano/Theano

Cafee2:
> https://caffe2.ai/
> https://github.com/caffe2

Deeplearning4j:
> https://deeplearning4j.org/

Scikit-learn:https://scikit-learn.org/stable/
> https://github.com/scikit-learn/scikit-learn

Deep Learning.Ai:
> https://www.deeplearning.ai/

OpenCv:
> https://opencv.org/
> https://github.com/qqwweee/keras-yolo3

YOLO:
> https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/

nVIDIA:CUDA

> https://developer.nvidia.com/cuda-math-library

Map POs with CIs and PIs:

Course Outcome	PO no and Keyword	Competency Indicator	Performance Indicator
CO1	PO1:Apply	1.1	1.1.1
		1.4	1.1.2
			1.1.4
	PO3:Design/Develop	3.1	3.1.1
			3.1.2
			3.1.3
			3.1.4
			3.1.5
	PO3:Design/Develop	3.4	3.4.1

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CO2			3.4.2
			3.4.3
	PO5:Create & Apply	5.1	5.1.1
		5.3	5.1.2
			5.3.1
			5.3.2
CO3	PO4:Research-based Knowledge	4.1	4.1.1
			4.1.2
			4.1.3

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Year: II   **Semester: I**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0106	Surveying Lab	0	0	4	2

Course Outcomes:

1: Understand basic principles of plane table surveying and fly leveling.

2: Understand basic concepts of theodolite survey and trigonometric leveling

3: Understand basic concepts of total station

4:Uunderstand the components of simple curve and able to set the curve on field.

5: Understand modern techniques in the survey systems.

LIST OF FIELD WORKS:

1. Chain Survey: Finding the area of a given boundary
2. Plane table survey: Finding the area of a given boundary
3. Compass Survey: Determining the Horizontal Angles and Area
4. Fly levelling: Height of the instrument method and rise and fall method.
5. Measurement of Horizontal and vertical angle by theodolite
6. Total Station: Determination of Remote height and distance.
7. Total Station: Determination of area.
8. Total Station: Preparation of contour maps for small area
9. Stake out using total station
10. Setting out of building using total station and curve setting

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Year: II   **Semester: II**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19AES0510	**Basics of Python Programming Lab**		0	2	1

Lab Outcomes:

Student should be able to

- Design solutions to mathematical problems.
- Organize the data for solving the problem.
- Develop Python programs for numerical and text based problems.
- Select appropriate programming construct for solving the problem.
- Illustrate object oriented concepts.

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator

2. Write a function that draws a grid like the following:

```
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
```

3. Write a function that draws a Pyramid with # symbols

```
                #
      #         #         #
     #     #        #     #     #
    #   #       #    #   #   #   #
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice

5. Write a program that draws Archimedean Spiral

6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.

7. The time module provides a function, also named time that returns the current Greenwich Mean Time in "the epoch", which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

>>> import time

>>> time.time()

1437746094.5735958

Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given n+r+1 <= 2r . n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies the above.

9. Write a program that evaluates Ackermann function

10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of $1/\pi$:

Write a function called estimate_pi that uses this formula to compute and return an estimate of π.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than $1e^{-15}$ (which is Python notation for 10^{-15}). You can check the result by comparing it to math.pi.

11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.

12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.

13. Given a word which is a string of characters. Given an integer say 'n', Rotate each character by 'n' positions and print it. Note that 'n' can be positive or negative.

14. Given rows of text, write it in the form of columns.

15. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don't consider special characters). Draw a histogram to represent the same

16. Write program which performs the following operations on list's. Don't use built-in functions
a) Updating elements of a list
b) Concatenation of list's
c) Check for member in the list
d) Insert into the list
e) Sum the elements of the list
f) Push and pop element of list
g) Sorting of list
h) Finding biggest and smallest elements in the list
i) Finding common elements in the list

17. Write a program to count the number of vowels in a word.

18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.

19. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in different eras.

20. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from the file.

21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.

22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.

23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.

25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 <= YYYY <= 9999$, $1 <= MM <= 12$, $1 <= DD <= 31$) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 <= HH <= 23$, $0 <= MM <= 59$, $0 <= SS <= 59$)

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3"; 3rd edition,
Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI

Year: III   **Semester: I**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APE0101	Building Planning and bye-laws	2	0	0	2

Course Outcomes: At the end of the course the student will able to

1. Understand the Principles of Building Planning
2. Understand the Building Bye–Laws and Regulations
3. Understand the Planning of Residential Buildings Public Buildings
4. Understand the Buildings Safety And Comfort
5. Understand the sign conventions and bonds doors and windows

UNIT – I

Principles of Building Planning: Types of buildings, types of residential buildings – site selection for residential building, orientation of buildings; aspect; prospect grouping, circulation, privacy, economy, flexibility and practical considerations.

UNIT – II

Building Bye–Laws and Regulations: Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

UNIT – III

Planning of Residential Buildings: Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Veranda – Drawing room – Bed room – Kitchen – Dining room– Bath room

Public Buildings: Planning of Educational institutions, hospitals, Office buildings.

UNIT – IV

Buildings Safety And Comfort: Aspects of safety-structural, fire and constructional safety. Components of building automation system -fire-fighting, communication etc. design for thermal comfort, ventilation comfort, lighting comfort,

UNIT – V

SIGN CONVENTIONS AND BONDS: Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys, lead, zinc, tin,, earth, rock, timber and marble . English bond & Flemish bond; odd & even courses for one, one and half

DOORS AND WINDOWS: Paneled Door – paneled and glazed door; glazed windows – paneled windows;

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.
2. Building planning and design – N.Kumara swamy and A.Kameswara rao. Charitor publications.

REFERENCE BOOKS:

1. National Building Code of India 2016 (NBC 2016) - SP 7:2016
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc   Graw Hill.

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Year: III   **Semester: I**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0118	Computer- aided Civil Engineering Drawing Lab	0	0	3	1.5

Course Outcomes: After the completion of the course student should be able to
1. Understand the concepts and basics of CAD
2. Understand the building plan elevation and section drawings
3. Understand the building components drawings

LIST OF THE EXPERIMENTS

1. Introduction to computer aided drafting and Practice exercises on CAD Commands

2. Drawing of plans for Single storey buildings

3. Drawing of plans for Multi storey buildings

4. Development of sections and elevations for Single storey buildings

5. Development of sections and elevations for Multi storey buildings

6. Detailing of building components like doors, windows

7. Development of building components roof trusses

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Year: III   Semester: II   Branch of Study:
                              CE

Subject Code	Subject Name	L	T	P	Credits
19APC0123	Remote Sensing and GIS Lab	0	0	3	1.5

Course Outcomes: After the completion of the course student should be able to
1. To understand spatial technologies, mapping the field problems and solution convergence through GIS.

LIST OF THE EXPERIMENTS

1. Development of georeferencing of maps either from cadastral or AutoCAD based map.
2. Identification of best locations of ground control points and mosaicing the different sources of maps of information like topo sheets & satellite data and other drawings.
3. Digitization and GIS coordination
4. GIS interface and features using open Source Software QGIS.
5. Case example on mapping like water distinguish, Road alignment road network etc.,

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PG **Year: I**	**Semester: I**	**AK19 Regulations** **Branch of Study: CE**			

Subject Code	Subject Name	L	T	P	Credits
19DMC9901	English for Research Paper Writing	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'sbook .
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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Year: I   **Semester: I**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DPC0103	Structural Design Lab-I	0	0	2	2

Course Outcomes: At the end of the course, students will be able to
1. Design and Detail of simple beams
2. Design and Detail of simple frames and Truss
3. Design and Detail complete all the Structural Components of Frame Buildings.
4. Design and Detail complete Multi-Storey Frame Buildings.
5. Analyze a Tall building for wind force

List of Experiments/Assignments: Design of Structures Using software
1. Analysis of Cantilever, Simply Supported Beam, Fixed Beams, Continuous Beams for Different Loading Conditions.
2. Analysis and design of plane and space frame
3. Analysis and Design of plane and space truss
4. Analysis, design and detailing of a multistoried building and Preparation of detailed drawings of different structural elements
5. Wind analysis on tall structure
6. Analysis and Design of steel transmission line tower

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI

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Year: I   **Semester:II**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DPC2007	Structural Design Lab-II		0	4	2

Course Outcomes: At the end of the course, students will be able to
1. Design and Detail of Prestressed Concrete members
2. Design and Detail of Water Tanks.
3. Design and Detail of bridge girder and cylindrical shell.
4. Determine the Dynamic of tall building.
5. Design and Detailing of different foundations.

List of Experiments:

1. Dynamic analysis of tall buildings
3. Analysis and design of bridge girder
4. Analysis of Cylindrical shell
5. Analysis and Design of Water Tanks.
6. Design of Raft, Combined, Isolated foundations.
6. Analysis and Design of prestressed concrete continuous slab
7. Analysis and Design of prestressed concrete continuous beam

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Year: I   **Semester:II   Branch of Study: CE**

AK19 Regulations

Subject Code	Subject Name	L	T	P	Credits
19DPC2008	FEM Laboratory '	0	0	4	2

Course Outcomes: At the end of the course, students will be able to
1. Identify mathematical model for solution of common engineering problems
2. Understand the concept of meshing for rectangular and circular plates
3. Analyze the bar elements and truss elements using FEM software
4. Analyze the 2D Frame and 3D frame using FEM software

List of Experiments/Assignments:
1. Discretisation of Geometry
2. Meshing a rectangular plate using 4 node elements
3. Meshing the circular plate using 3 node and 4 node elements
4. Analysis of an assembly of bar elements
5. Analysis of a stepped bar
6. Analysis of a plane truss
7. Analysis of a space truss
8. Analysis of a fixed beam
9. Analysis of a 2D-Frame
10. Analysis of a 3D-Frame

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Year: I   **Semester: I**   **AK19 Regulations**
                                            Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DML0101	Research Methodology and IPR	2	0	0	2

Course Outcomes: At the end of the course, students will be able to
1: To acquaint with basics of research problem formulation
2: Familiar with research related information and ethics.
3: aware about research report writing and presentation.
4: Understand and get knowledge of basic rights for protection of innovatives.
5: Understand different types of IPRs

Unit I

Introduction to Research – Types of Research, Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches to investigation of solutions for research Problem.

Unit II

Review of Literature and Data Collection - Effective literature studies approaches, analysis, Plagiarism and Research ethics.
Data collection, analysis, interpretation, Necessary instrumentations.

Unit III

Report Writing- Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit IV

Intellectual Property Rights: Nature, Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit V

Patent Rights- Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications.
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

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