

**Deccan Education Society's
FERGUSSON COLLEGE (AUTONOMOUS),
PUNE**

**Syllabus
for**

S. Y. M. Sc. (Computer Applications)
[NEP 2020 Pattern]
(M.Sc. Semester-III and Semester-IV)

From Academic Year
2024-25

Deccan Education Society's
Fergusson College (Autonomous), Pune

S. Y. M.Sc. (Computer Applications) (NEP 2020 Pattern)

From academic year 2024-25

Semester	Paper Code	Course Title	Theory /practical/OJT	Credit
3	CSA-601	Python Programming	Theory	4
	CSA-602	Mean Stack	Theory	4
	CSA-610	Research Project	Project	4
	CSA-603 OR	Software Testing	Theory	4
	CSA-604	Information Security		
	CSA-620	Practical V(Advanced Software Engineering Practices)	practical	2
	CSA-621	Practical VI(Python + Mean Stack)	practical	2
4	CSA-651 OR	Data Mining	Theory	4
	CSA-652	MOOC'S		
	CSA-653	Software Project Management	Theory	2
	CSA-660	Research Project	Project	6
	CSA-671	OJT/Internship	Practical	8

Teaching and Evaluation (Only for FORMAL education courses)

Course Credits	No. of Hours per Semester Theory/Practical	No. of Hours per Week Theory/Practical	Maximum Marks	CE 40 %	ESE 60%
1	15 / 30	1 / 2	25	10	15
2	30 / 60	2 / 4	50	20	30
3	45 / 90	3 / 6	75	30	45
4	60 / 120	4 / 8	100	40	60

Eligibility: As per the rules and regulations of Savitribai Phule Pune University (SPPU)

S.Y. M.Sc. Semester III		
CSA-601	Python Programming	Credits: 04
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Proficiency in Python Fundamentals: - Demonstrate a strong understanding of Python basics, including variables, data types, operators, and input/output mechanisms. Exhibit the ability to write simple Python programs and navigate Python IDEs	
CO2	Mastery of Control Flow and Functions: Apply control flow structures, such as conditional statements and loops, effectively in Python programs. Develop modular programs using functions, understand scope, and employ function arguments and return values.	
CO3	Competence in Data Structures: Utilize lists, tuples, dictionaries, and sets to organize and manipulate data. Apply file handling techniques, including reading, and writing text files, and demonstrate proficiency in handling exceptions	
CO4	Application of Object-Oriented Programming (OOP) Principles: Understand and apply object-oriented programming principles, including the creation of classes and objects, implementation of inheritance, encapsulation, and polymorphism to solve programming problems.	
CO5	Implementation of Advanced Concepts and Modules: Import and use modules effectively, create and organize code using packages. Demonstrate basic usage of popular libraries like NumPy and Pandas for data manipulation.	
CO6	Proficiency in GUI and Web Development Basics: Create basic GUI applications using Tkinter, understand event-driven programming, and demonstrate knowledge of web development basics using Flask. Develop a simple web application as part of the course project.	

Unit Number	Title of Unit and Contents	No of lectures
1	Basics of Python: introduction, Overview of Python, Installation and setup, Python IDEs and basic usage, Variables and data types, Operators and expressions, Input, and output, - Conditional statements (if, elif, else), Loops (while, for), Control flow, Function definition and syntax, Scope and lifetime of variables, Function arguments and return values	15
2	Data Structures & OOP: Lists: creation, indexing, slicing, methods, Tuples: creation, immutability, Dictionaries: keys, values, methods, Sets: creation, operations object, classes, importing modules, Creating, and using packages.	12
3	Functions: Function definition and syntax, Scope and lifetime of variables, Function arguments and return values	5
4	File Handling: Reading and writing files, operations on file and Exception handling.	5

5	Working with Libraries: - Overview of popular libraries (NumPy, Pandas), Basic usage of a data manipulation library, Overview of GUI libraries (Tkinter), Basic GUI application development	18
6	Web Development Basics (Flask) :- Introduction to web frameworks, building a simple web application using Flask	5

Learning Resources

1. Bruce J. MacLennan, Functional Programming: Practice and Theory, 1990
2. Greg Michaelson, An Introduction to Functional Programming Through Lambda Calculus (Dover Books on Mathematics) Paperback, 2011
3. Kenneth C. Loudon, Programming Languages: Principles and Practice, 3rd Edition, 2013
4. Michael Dawson, Python Programming for the Absolute Beginner, 3rd Edition, Cengage Learning, 2011
5. David Beazley, Python Essential Reference, Third Edition, 2006
6. E-Books: python tutorial. pdf, python_book_01.pdf
7. Mark Lutz, Learning Python, O'Reilly, 2009
8. <https://docs.python.org>
9. <https://docs.python.org/3/tutorial/index.html>

CSA-602	Mean Stack	Credits : 04
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Describe web development using different technologies like HTML, CSS, JavaScript	
CO2	Explain What MEAN stack development is?	
CO3	Apply various technologies to develop server side and client-side applications. To create expressive and dynamic websites	
CO4	Plan web development by implementing various techniques of Angular JS, NodeJS, ExpressJS etc.	
CO5	Justify various web designs and development techniques.	
CO6	Express database designs using MongoDB	

Unit Number	Title of Unit and contents	No of lectures
1	<p>Induction for Full Stack Web Developer - MEAN Stack:</p> <p>Learn what Full Stack Web Developer is?, What are different approaches to web development?, Introduction to different types of technologies.</p>	4
2	<p>Fundamentals of web development:</p> <p>Agile and Scrum methodologies, 2.2 HTML, CSS, and JavaScript, GIT to manage version control systems.</p>	5
3	<p>Develop frontend with Angular:</p> <p>Introduction to front and back-end web development. Introduction to Angular.js., Introduction to TypeScript and ES6, Components in Angular, Data and Event Binding, Structural Directives, Attribute Directives and Property Bindings, Template/Model Driven Forms, Pipes and Data Formatting, Service and Dependency Injection , Introduction to Single Page Application, Angular Component Router, Modules , Deploying an Angular App</p>	12
4	<p>Introduction to Node.js. :</p> <p>Introduction Node.js, Why Node.js? Feature of Node.js, Node.js Installation & configuration, Where to use Node? , Server-side JavaScript, Asynchronous events vs. threads Performance, Server utilization .</p>	12

6	Introduction to Express.js : Routing in Express.js ,Middleware in Express.js ,Templating Engines with Express.js , Handling Static Files , Error Handling , RESTful API Development ,Authentication and Authorization, Database Integration ,Sessions and Cookies , Express.js Best Practices	12
7	INTRODUCTION TO NOSQL DB : Introduction to NOSQL DB ,Overview of DB ,Adv of NOSQL DB ,Type of NOSQL DB ,Introduction to MongoDB	10
8	Integrate and Deploy MEAN app	5

References:

1. Angular: Up and Running: Learning Angular, Step by Step. O’rielly Publication.
2. Node.Js: The Comprehensive Guide Grayscale Indian Edition
3. Beginning Node.Js, Express & MongoDB Development
4. Javascript - The Definitive Guide O’rielly Publication.
5. MongoDB – The Definitive Guide 2e O’rielly Publication.
6. Head First HTML with CSS and XHTML by Elisabeth Freeman; Elisabeth Robson; Eric Freeman O’rielly Publication.

CSA-610	Research Project	Credit :04
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	To enable the students to undertake research projects that are relevant and important.	
CO2	To apply pre-learnt concepts to design research problem with help of literature survey.	
CO3	To enable students to do sufficient groundwork in terms of preparing the outline of research plan which includes grants, infrastructural requirements and procurement of resources.	
CO4	To allow students the opportunity to develop a thorough research proposal. UGC guidelines to be followed for writing the research proposal.	
CO5	To encourage research culture which includes exploring collaborative project ideas.	
CO6	To give students the opportunity to present their proposal before funding agencies and if possible, procure funding for the project	

Introduction

The NEP 2020 has emphasized the inclusion of research and development in Higher Education Institutions. As colleges are integral part of knowledge impartment and creation NEP 2020 has introduced the research component to quite substantial degree at post graduate level. The multidisciplinary, transdisciplinary and translational research culture is expected to be introduced at postgraduate level. Such research project undertaken will obviously enhance the research productivity, collaboration at national and international level in various industries, government as well as community based organizations and agencies.

Outcome

- I. Students will do the groundwork for research in terms of identifying relevant research topic (relevance will be decided based on the subject). Identifying the queries and literature review.
- II. Define well formulated specific objectives that help develop the overall research methodology,
- III. By the end of the semester the student is expected compile and communicate the Research Proposal with proper format and if possible have procured funding for the Same

CSA-603	Software Testing	Credits: 04
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Describe the need of software testing and list different types of defects.	
CO2	Discuss the basic concepts of testing techniques and illustrate various types of testing.	
CO3	Apply software testing skills in different domains and develop test plans for evaluation.	
CO4	Detect the issues in software applications with different defects management and metrics used.	
CO5	Select appropriate automation tool for testing and analyze its effectiveness on agile methodology.	
CO6	Design the test cases to improvise the efficiency of the application.	

Unit No	Title of Unit and contents	No of lectures
1.	Software Testing Fundamentals Software testing- Definition, Importance of Testing, Role of Tester, Software Testing Principles, Software Testing Life Cycle, Defects - Definition and types of defects, Defect Management Process, Defect/Bug Life Cycle	8
2.	Types of Testing Manual Testing- Black Box testing, White Box testing, Unit testing, System testing, Integration testing and Acceptancetesting, Automation testing- Automation Testing, Automated TestingProcess, Test tool selection, Framework for Automation, Types of Automated Testing and Automation Testing Tools,, Regression Testing, Non-Functional Testing	8
3.	Test Case Development Overview of Test Documentation, Writing Test Cases, TestAnalysis, Requirements Traceability Matrix (RTM), Test Data Generation: and What is, How to, Example, Tools	6
4.	Testing Techniques Software Testing Techniques with Test Case Design, Boundary Value Analysis, Equivalence Partitioning, Decision Table Testing, State Transition Testing, Use Case Testing, AgileMethodology, Scrum Testing Methodology	12
5.	Understanding Agile Testing Definition of agile testing, Agile Testing Methodology, Test-driven development (TDD) and behavior-driven development (BDD), Acceptance Test-Driven Development (ATDD), Agile testing strategy, Benefits of Agile testing, Most common Agile Estimation techniques, Defect Management	14

	Process, Metrics and Reporting of Agile Testing	
6.	Testing Applications in Different Domains Introduction to different software Testing tools, Automation Tools, Agile Testing Tools, Case Studies based on different domains. (Minimum 2 case studies should be taken)	12

Learning Resources:

References:

1. Srinivasan Desikan, “Software Testing Principals and practices”, Pearson Publication ISBN-13 978-8-17-758295-6, 2013
2. Glenford J. Myers, Corey Sandler, Tom Badgett, “The Art of Software Testing”, 3rd Edition ISBN: 978-1-118-13315-6, 2011
3. Kshirasagar Naik And Priyadarshi Tripathy, “Software testing and quality assurance: Theory and Practice”, A John Wiley & Sons, Inc., Publication, ISBN 978-0-471- 78911-6, 2008

Web Contents-

1. www.tutorialspoint.com
2. <https://www.javatpoint.com/software-testing-tutorial>
3. <https://www.guru99.com/software-testing.html>
4. <https://www.perforce.com/blog/alm/what-agile-testing-5-examples>
5. <https://www.shakebugs.com/blog/defect-management-process/>
- 6.

e-resources-

1. <http://epathshala.nic.in/>
2. <https://www.coursera.org/>
3. <https://inlibnet.ac.in/>

S.Y. M.Sc. (CA) Semester III

CSA-604	Information System and Security	Credits: 4
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Describe different types of security in computing.	
CO2	Explain the concepts related to Info-Sys-Security, Network security, Electronic communication	
CO3	Solve the security problems by choosing appropriate programming interface (API).	
CO4	Analyse the requirements of computer security and choose the appropriate security technique such as cryptography, message digesting, authentication	
CO5	Evaluate the different types of attacks which are possible on digital environment.	
CO6	Design a secure digital environment implementing usability parameters	

Unit	Contents	
1.	Security in Computing: The need for Security, Security Principles, Program Security Operating system security, Database security, Device Security (IOT , mobile security)	5
2.	Attacks on Information and possible security measures Attacks, Vulnerability, Security Goals, Security Services, and mechanisms	6
3.	Conventional Cryptography Techniques: Concept of cryptography, Plain Text and Cipher Text ,Substitution Techniques ,Transposition Techniques	6
4.	Symmetric and Asymmetric Key Cryptography : Algorithm types and modes ,Symmetric Key Cryptography ,DES, Double DES, Triple DES ,Overview of IDEA, RC5, Blowfish, AES ,Diffie-Hellman key exchange Algorithm ,Asymmetric Key Cryptography ,RSA algorithm ,Best of Symmetric and Asymmetric key Cryptography – Digital Envelope	10
5.	Applications of Message Digest Overview of Message Integrity, MD5, SHA, Digital Signature Digital Certificates	6
6.	Security in Networks Secure Socket Layer, Transport Layer Security, HTTP / SHTTP ,Time Stamping Protocol	6
7.	Security in Electronic Communication: Electronic Money, Secure Electronic Transaction – SET ,Email Security- PGP, PEM .	6
8.	User Authentication and Kerberos Password based Authentication., Certificate-based Authentication , Kerberos	5

9	Server Security & Firewalls Firewall, Honeypots, DMZ networks ,IP security ,VPN Intrusion Detection, IDS, Intrusion Prevention Systems (IPS)	5
10	Designing Security Usable Security, Cryptography solutions using different programming language & Cryptographic Toolkits, Message Digesting Solutions	5

References:

1. Andrew Tanenbaum, Computer Networks Fourth Edition
2. Atul Kahate, Cryptography and Network Security Second Edition
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, Security in Computing 5th edition, Prentice Hall
4. Wenbo Mao, Modern Cryptography: Theory and Practice, Prentice Hall.
5. William Stallings, Cryptography and Network Security Principles And Practice, Fourth or Fifth Edition, Pearson
6. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall.

CSA-620	Practical V(Advanced Software Engineering Practices) (Project)	Credits: 02
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	List and define different problem statements.	
CO2	Explain different software development life cycle models and approaches to solve the problem of a project.	
CO3	Apply resource management skills for the project.	
CO4	Integrate the modules using different techniques and tools.	
CO5	Decide and draw relevant diagrams related to the concerned problem.	
CO6	Prepare the solutions through presentations and technical reports for the concerned problem.	

Sr. No.	Details
I	Selection of Problem Statement
II	Collection of Synopsis
III	Design the problem solution
IV	Implementation of design and refinement if needed
V	Working Progress Report – I
VI	Working Progress Report – II
VII	Working Progress Report – III
VIII	Final report writing and presentation

1. Object Oriented System Development - Ali Bahrami McGRAW-HILL InternationalEdition, 2017.
2. UML in Nutshell, O'reilly Publication, 2015.
3. Software Engineering by Roger Pressman (6th edition), 2009.
4. The Unified Modeling Language user guide by Grady Booch, James Rumbaugh, IvarJacobson, 2005.
5. Object Oriented Modeling and Design with UML by James Rumbaugh, MichaelBlaha, 2004.
6. UML 2 Bible by Tom Pender, 2002.
7. Object-Oriented Software Engineering: A Use Case Driven Approach by IvanJacobson, 1992.

Title of the Course and Course Code	CSA-621 Practical VI (Python + Mean Stack Practical)	Number of Credits : 02
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Identify the concepts of Python programming and RDBMS to design solutions for different types of problems.	
CO2	Explain the use of data structures of Python programming and stored functions, cursors, triggers and views in PL/SQL.	
CO3	Implement stored functions, cursors, triggers and views using PL/SQL programming concepts.	
CO4	Analyse and execute string handling, file handling and operations on data structures using controls statements, loops and functions.	
CO5	Test and validate the outputs of Python programs and SQL queries.	
CO6	Write programs to design applications using concepts of Python language and relational database concepts	

Sr.No.	Python Assignment
1	Assignment 1: Python Basics and Data Structures
2	Assignment 2: (OOP) and File Handling.
3	Assignment 3: Functions and Modules
4	Assignment 4: Working with python Libraries
5	Assignment 5: GUI Development
6	Assignment 6: Web Development with Flask
Sr.No.	MEAN Stack Assignment
1	Assignment 1: based on HTML, CSS
2	Assignment 2: based on JavaScript
3	Assignment 3: based on AngularJS
4	Assignment 4: based on NodeJS
5	Assignment 5: based on ExpressJS
6	Assignment 6: Case Studies on MEAN Stack Application

S.Y. M.Sc. Semester IV		
CSA-651	Data Mining and Data Warehousing	Credits: 04
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Describe the basic concepts of data mining and data warehousing.	
CO2	Discuss schema types of dimensional data modelling.	
CO3	Apply pre-processing techniques to improve the overall quality of the pattern mined from the data.	
CO4	Analyze classification and clustering algorithms.	
CO5	Evaluate performance of association rule mining algorithms.	
CO6	Perform data mining tasks using python /R Programming .	

Unit No.	Title of Unit and Contents	Credits
I	Introduction to Data Mining Definition of Data Mining and Data Warehousing, DM versus Knowledge, Discovery in Databases, Data to be mined, Basic mining techniques, Data Mining Issues, KDD	8
	Getting to Know Your Data Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity	8
II	Data Pre-processing Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization	12
III	Introduction to Data Warehousing Architecture of DW, OLAP and Data Cubes, Dimensional Data Modeling-star, snowflake schemas, Concept of data mart	8
IV	Association Rule Mining Market Basket analysis, Frequent item-sets, Association rule mining: Apriori algorithm, FP growth algorithm, Sampling Algorithms	6
V	Classification & Prediction Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Model Evaluation and Selection, Techniques to Improve Classification Accuracy	12
VI	Clustering Definitions, Partitioning methods, Hierarchical clustering, Density Based methods.	6

Learning Resources

1. Tom Mitchell, Machine Learning, McGraw Hill, 1997
2. R.O. Duda, P.E. Hart, D.G. Stork, Pattern Classification, Second edition, 2011
3. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, ISBN:9789380931913, Elsevier Morgan Kaufmann Publishers, 3rd Ed., 2012
4. Margaret H. Dunham, S. Sridhar, Data Mining - Introductory and Advanced Topics, Pearson Education, 2012
5. George Marak, Modern Data warehousing and mining and visualization, Pearson Publication

S.Y. M.Sc. Semester IV		
CSA-653	Software Project Management	Credits: 02
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Analyze Software Project Characteristics: Identify key characteristics of software projects. Recognize challenges and complexities in the software development environment.	
CO2	Evaluate Software Scope and Feasibility: Assess software scope and conduct feasibility analyses. Identify factors influencing project feasibility for informed decision-making.	
CO3	Develop Comprehensive SPM Plans: Create detailed Software Project Management (SPM) plans. Include resource identification and allocation strategies for effective project planning.	
CO4	Apply Size and Scope Estimation Techniques: Proficiently apply size and scope estimation techniques. Use decomposition, Work Breakdown Structure (WBS), Function Points (FP), and Lines of Code (LOC).	
CO5	Implement QA and Risk Management Strategies: Differentiate between quality control and quality assurance. Implement formal technical reviews and apply risk management strategies for project quality and risk mitigation.	
CO6	Utilize Project Monitoring and Control Tools : Acquire skills in using project monitoring and control tools. Use GANTT charts, Activity Networks, and Earned Value Analysis for data-driven decision-making and monitoring project progress.	

Unit No	Title of Unit and Contents	No of Lectures
1	Introduction to Software Project Management: Characteristics of a Software Project, Software Scope and Feasibility, Resources and SPM Plan, Size/Scope Estimation, Function Point and LOC, GANTT Charts and Activity Networks, PERT/CPM Networks	8
2	Software Project Models and Quality Assurance: COCOMO I and COCOMO II Models, Quality Control and Assurance, Formal Technical Reviews, SQA Plan, ISO, and CMM Standards, Risk Management Strategies, Risk Projection and Refinement	8
3	Project Monitoring and Control: Monitoring and Management, RMMM Plan (Risk Mitigation, Monitoring, and Management) , Earned Value Analysis , Team Structures and Software Process , Resource Levelling and Building a Team	8
4	Configuration Management and Project Closure: Configuration Management Basics, SCM Process and Change Control, Configuration Audit and Project Monitoring , Project Monitoring and Control - Audits and Reviews	6

References

1. Pankaj Jalote, Software Project Management in Practice, Pearson Education Asia (2002).
2. Bob Hughes and Mike Cotterell, Software Project Management, Tata McGraw Hill Publishing Company Ltd., New Delhi (2006) 3rd ed.
3. Roger Pressman, A practitioner's Guide to Software Engineering, Tata McGraw Hill (2004).
4. Tom Demarco, Controlling Software Project Management, Measurement, Prentice Hall, New Jersey (1982).
5. Watts S. Humphrey, Winning with Software An Executive Strategy, Pearson Education Asia (1998).
6. Philip Metzger, Managing A Programming Project, Prentice Hall, New Jersey (1983).
7. Tom Glib, Finzi Susannah, Principles of Software Engineering Management, Addison Wesley, England

CSA-660	Research Project	Credit :06
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	To facilitate substantial data collection for the proposed research work	
CO2	To carry out research following ethical aspects of research activities.	
CO3	To compile and communicate the findings/conclusions / results obtained in the science community through various means of communication.	
CO4	To enable students to put together a research paper that can be published or presented at conferences.	
CO5	Focus on quality review of the research papers and may be published in peer reviewed journals or may be presented in conferences / seminars. The research project outcome can be considered for evaluation based on following criteria.	
CO6	Research Publication in Peer reviewed, Scopus / UGC -CARE indexed journal	

Introduction

The research project proposal needs to be implemented by following the given timeline Under the NEP, students are expected to get industry ready by the time they pass out of their Masters' degree course. There is also an emphasis on research so that every student is expected to carry out independent research project as a part of their Post Graduate program. The emphasis is on research that is socially applicable, and carried out with scientific rigor. One benchmark of good quality research is publication of the project either in International or National level scientific journals or the presentation of students' research work at International, National or State level conferences. With this broad objective, the following has been proposed for student research projects at Masters level.

Outcome:

- I. Carry out a substantial research-based project
- II. Capacity development to analyze data and process research findings
- III. Use research findings to advance education theory and practice.
- IV. Focus on quality review of the research papers and may be published in peer reviewed journals or may be presented in conferences / seminars. The research project outcome can be considered for evaluation based on following criteria.
- V. Research Publication in Peer reviewed, Scopus / UGC -CARE indexed journal.
- VI. Poster/ Oral Presentation in seminars/ conferences outside the institute
- VII. Poster/ Oral Presentation in seminars/ conferences arranged by the institution.
- VIII. The dissertation will be done as per the guidelines of UGC

CSA-671	OJT/Internship	Credit :08
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Describe the different skills, attitude, and knowledge to understand the professionalism in the IT industry	
CO2	Discuss the working culture of the industry in view to maintain quality standards	
CO3	Implement the confidence, presentation skills and logical thinking in developing the system	
CO4	Differentiate between the academics and professional work culture in timely delivery of projects	
CO5	Compare and contrast the professional development of the programs and project	
CO6	Combine the techniques to enhance oneself as a thorough software	

INTRODUCTION

On-the-job training (OJT) is one of the most influential and well-established ways of teaching students the skills and knowledge needed to work in a professional environment. OJT often can facilitate a smooth transition from university to the industry/ market. As a result, several organizations give OJT to students before appointing them to full-time job positions. The newly introduced course structure in the NEP2020 envisages imparting strong knowledge, skills to improve the job potential of the students by providing experiential learning opportunities, values, and a research oriented vibrant higher education ecosystem for sustainable development. With these perspectives, in the NEP 2020 guidelines, OJT/ Internship/ Field work is made mandatory in the curriculum of all post graduate programmes.

Internships includes working with government or private organizations, higher education institutions, universities, research and development, labs/research organisations/non-government organisations, enterprises, centres involved in research, innovativeness and entrepreneurship, business organizations, local industry, artists, craftspeople, and similar other entities for providing opportunities to students for active engagement in on-site experiential learning.

It helps students get direct experience in using tools, software, techniques, equipment used, gain experience in data collection from the relevant field, conducting surveys etc. in a live environment and experience the work culture.

During an OJT program, students work under the supervision of experienced professionals and are given tasks and responsibilities that are relevant to their field of study. They are also given feedback and guidance on their performance, which allows them to improve their skills and knowledge. OJT programs can vary in length, depending on the industry and the requirements of the program. Successful completion of the OJT can improve the employment potential of the students or can also get an opportunity to continue their work as a research project in subsequent semesters.

Internships can be mutually beneficial for the intern as well as the internship providing organization. The internship providing organizations provide training with an objective to create a pipeline of great future employees