**Resolution No:** AC/II(22-23).3.RPS7

# S. P. Mandali's

# Ramnarain Ruia Autonomous College

***(Affiliated to University of Mumbai)***

## Syllabus for M.Sc

## Program: M.Sc (Information Technology)

## Program Code: Information Technology (RPSIT)

## (Choice Based Credit System for the academic year 2023-2024)

# GRADUATE ATTRIBUTE

S. P. Mandali's Ramnarain Ruia Autonomous College has adopted the Outcome Based Education model to make its science graduates globally competent and capable of advancing in their careers. The Post graduate Program in Science also encourages students to reflect on the broader purpose of their education.

| GA | Description<br>A student completing Master's Degree in Information Technology program will be able to: |
|---|---|
| **GA1** | Demonstrate in depth understanding in the relevant science discipline. Recall, explain, extrapolate and organize conceptual scientific knowledge for execution and application and also to evaluate its relevance. |
| **GA2** | Critically evaluate, analyze and comprehend a scientific problem. Think creatively, experiment and generate a solution independently, check and validate it and modify if necessary. |
| **GA3** | Access, evaluate, understand and compare digital information from various sources and apply it for scientific knowledge acquisition as well as scientific data analysis and presentation. |
| **GA4** | Articulate scientific ideas, put forth a hypothesis, design and execute testing tools and draw relevant inferences. Communicate the research work in appropriate scientific language. |
| **GA5** | Demonstrate initiative, competence and tenacity at the workplace. Successfully plan and execute tasks independently as well as with team members. Effectively communicate and present complex information accurately and appropriately to different groups. |
| **GA6** | Use an objective, unbiased and non-manipulative approach in collection and interpretation of scientific data and avoid plagiarism and violation of Intellectual Property Rights. Appreciate and be sensitive to environmental and sustainability issues and understand its scientific significance and global relevance |

| | |
|---|---|
| **GA7** | Translate academic research into innovation and creatively design scientific solutions to problems. Exemplify project plans, use management skills, and lead a team for planning and execution of a task. |
| **GA8** | Understand cross disciplinary relevance of scientific developments and relearn and reskill to adapt to technological advancements. |

# PROGRAM OUTCOMES

| PO | Description<br><br>**A student completing Master's Degree in Science program in the subject of Information Technology will be able to:** |
|---|---|
| PO 1 | Achieve expertise in various subjects from the broad area of Information technology. |
| PO 2 | Design the solution to real world problems and issues using various software and hardware state of the art tools & softwares. |
| PO 3 | Analyze and compare the existing solutions and tools available to the problems and generate new solutions or tools. |
| PSO 4 | Use the techniques, skills and modern computing tools to emerge as a freelancer and entrepreneur in the field. |
| PSO 5 | Identify the changing computational domains and adapt the new age technologies and computing domain. |
| PSO 6 | Become a responsible citizen totally aware of environmental issues and develop solutions saving the environment. |
| PSO 7 | Assimilate professional ethics, managerial and soft skills to emerge as a leader to manage diverse projects in industry |

| | |
|---|---|
| PSO 8 | Apply domain expertise to pursue research in Computer science and Information Technology discipline. |

| **M.Sc (Information Technology)** | | | | | | |
|---|---|---|---|---|---|---|
| **SEMESTER – III (THEORY)** | | | | **SEMESTER – III(PRACTICALS)** | | |
| **YEAR** | **COURSE CODE** | **COURSE TITLE** | **CREDITS** | **COURSE CODE** | **COURSE TITLE** | **CREDITS** |
| M.Sc IT II | RPSIT301 **Core Course** | Cloud Computing | 4 | RPSITP301 | Practicals of RPSIT301 | 2 |
| M.Sc IT II | RPSIT302 **Core Course** | UX/UI Designing | 4 | RPSITP302 | Practicals of RPSIT302 | 2 |
| M.Sc IT II | RPSIT303 **Skill Enhancement Course** | Advanced IOT | 2 | RPSITP303 | Practicals of RPSIT303 | 2 |
| M.Sc IT II | - | - | - | RPSITP304 | Project | 6 |

| **M.Sc (Information Technology)** | | | | | | |
|---|---|---|---|---|---|---|
| **SEMESTER IV** | | | | | | |
| **SEMESTER – IV (THEORY)** | | | | **SEMESTER – IV (PRACTICALS)** | | |
| **YEAR** | **COURSE CODE** | **COURSE TITLE** | **CREDITS** | **PRACTICAL COURSE** | **COURSE TITLE** | **CREDITS** |
| M.Sc IT II | RPSIT401A **Discipline Specific Elective-1** | Deep Learning | 4 | RPSITP401A | Practicals of RPSIT401A | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| M.Sc IT II | RPSIT401B **Discipline Specific Elective-2** | Penetration Testing | 4 | RPSITP401B | Practicals of RPSIT401B | 2 |
| M.Sc IT II | - | - | - | RPSITP402 | Internship (500-600 Hours) | 18 |

# SEMESTER - III

Course Code: **RPSIT301**
Course Title: **CLOUD COMPUTING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Explain the Cloud Computing, Parallel Computing & Virtualization concepts |
| CO 2 | Discuss the Cloud Architecture and its Implementation |
| CO 3 | Demonstrate Cloud Programming and various Software Platforms and Environment |
| CO 4 | Discuss the role of Mobile Computing and its importance in today's world |
| CO 5 | Illustrate various Security & Privacy concepts in Cloud Computing |

| **COURSE CODE RPSIT301** | **COURSE NAME CLOUD COMPUTING** | **CREDITS 4 LECTURES** |
|---|---|---|

| | | |
|---|---|---|
| I | **Distributed System Models and Enabling Technologies:** Scalable Computing Service over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency Computer Clusters for scalable parallel computing: Clustering for massive parallelism<br>**Virtual machines and Virtualization of clusters and Data centers:** Implementation levels of virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory & I/O Devices, Virtual Cluster Resource Management, Virtualization for Data Center Automation. | 15 L |
| II | **Cloud Platform Architecture over Virtualized Data Centers:** Cloud Computing & Service Models, Data Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS and AZURE, Inter-cloud Resource Management, Cloud Security and Trust Management.<br>**Cloud Programming and Software Environments:** Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments. | 15 L |
| III | **Cloud Computing for Mobility:** Mobile Computing, Mobile Cloud Computing, Offloading in Mobile Cloud Computing, Green Mobile Cloud Computing, Resource Allocation in Mobile Cloud Computing, Sensor Mobile Cloud Computing, Mobile Social Cloud Computing. | 15 L |
| IV | **Security & Applications of Mobile Cloud Computing:** Privacy and Security in Mobile Cloud Computing, Trust in Mobile Cloud Computing, Vehicular Mobile Cloud Computing, Business Aspects of Mobile Cloud Computing, Application of Mobile Cloud Computing, Future Research Scope of Mobile Cloud Computing | 15 L |

Course Code: **RPSITP301**
Course Title: PRACTICAL OF **CLOUD COMPUTING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Compare and choose various cloud service platform (IAAS, PAAS, SAAS) |
| CO 2 | Choose various softwares for deploying cloud infrastructure |
| CO 3 | Demonstrate the deployment of various services in the cloud |

| **COURSE CODE**<br><br>**RPSITP301** | **COURSE NAME**<br><br>**PRACTICAL OF RPSIT301 (CLOUD COMPUTING)** | **CREDITS**<br><br>**2** |
|---|---|---|
| | 1. Create virtual networks of windows 7 systems using VMWare Technologies.<br>2. Create a Windows based client-server system using Windows 2012 Hyper-V.<br>3. Create a Linux based client-server system using Citrix Xen Server<br>4. Implement server clusters using Windows 2012 Hyper-V.<br>5. Working with a Cloud Management Software(OpenNebula/Eucalyptus)<br>6. Create a small website application using Google App Engine<br>7. Create a small website application using Windows Azure<br>8. Implement MapReduce and Hadoop<br>9. Using cloud database for storage. (Google/AWS etc) | |

**References:**

1. Kai Hwang, Jack Dongarra, Geoffrey Fox: Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, MK Publishers, 2012.
2. MOBILE CLOUD COMPUTING - Architectures, Algorithms and Applications, Debashis De

**Additional Reference:**

1. Michael Miller, Cloud Computing: Web-Based Applications that change the Way you work and collaborate Online, Pearson Publication, 2012.
2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter: Cloud Computing, A Practical Approach, McGraw Fill, 2010.

Course Code: **RPSIT302**
Course Title: **UX / UI DESIGNING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Demonstrate a solid understanding of user experience (UX) and user interface (UI) design principles. |
| CO 2 | Organise user research activities such as user interviews, surveys, usability testing, understand user needs, preferences, and behaviours. |
| CO 3 | Choose the process of UX/UI design that includes prototyping, evaluation and implementation. |
| CO 4 | Discuss the principles of interaction design and be able to design intuitive and engaging user interactions. |

| **COURSE CODE RPSIT302** | **COURSE NAME UX / UI DESIGNING** | **CREDITS 4 LECTURES** |
|---|---|---|
| I | **Introduction and Elements of UX Designing:** Introduction to UX Designing, User Experience and Why It Matters, Meet the Elements, The Strategy Plane, The Scope Plane, The Structure Plane, The Skeleton Plane, The Surface Plane. | 15 L |

| | | |
|---|---|---|
| II | **UX Designing Process: The Wheel:** A Lifecycle Template, Contextual Inquiry: Eliciting Work Activity Data, Contextual Analysis: Consolidating and Interpreting Work Activity Data, Extracting Interaction Design Requirements, Constructing Design-Informing Models, Design Thinking, Ideation, and Sketching, Mental Models and Conceptual Design, Design Production, UX Goals, Metrics, and Targets, Prototyping. | 15 L |
| III | **User Experience Research Techniques:** Research Planning, Competitive Research, Universal Tools: Recruiting and Interviewing, Focus Groups, More Than Words: Object-Based Techniques, Field Visits: Learning from Observation, Diary Studies, Usability Tests, Surveys, Global and Cross-Cultural Research, Others' Hard Work: Published Information and Consultants, Analyzing Qualitative Data, Automatically Gathered Information: Usage Data and Customer Feedback. | 15 L |
| IV | **Introduction to UI Designing:** A Design Process for Digital Products, Understanding the Problem: Design Research, Modeling Users: Personas and Goals, Setting the Vision: Scenarios and Design Requirements, Designing the Product: Framework and Refinement, A Basis for Good Product Behavior, Digital Etiquette, Designing for the Desktop, Designing for Mobile and Other Devices, Designing for the Web, Design Details: Controls and Dialogs. | 15 L |

Course Code: **RPSITP302**
Course Title: **PRACTICAL OF UX / UI DESIGNING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Use prototyping tools to create interactive prototypes of digital interfaces. |
| CO 2 | Design engaging and intuitive interactions for digital interfaces, including microinteractions such as animations, transitions and error handling. |

| | |
|---|---|
| CO 3 | Choose the industry-standard UX/UI design tools and technologies, such as Adobe XD, Sketch, Figma, InVision, Axure RP, and Zeplin. |

| **COURSE CODE RPSITP302** | **COURSE NAME**<br>**PRACTICAL OF RPSIT302 (UX/UI DESIGNING)** | **CREDITS 2** |
|---|---|---|
| | Designing UX/UI for various domains as given below:<br>● Interface for online shopping website.<br>● e learning web site<br>● Video/ Audio on demand web site<br>● ATM interface<br>● Automatic vending machine for Drinks<br>● Route finder<br>● Students' Kiosk for institute's information<br>● Web site for buying Car<br>● Week end holidays<br>● Pass port application tracking system<br>● Zoo information kiosk<br>● Museum Information Center<br>● Help desk for Hotel<br>● Patients information storage<br>● Catering Service ( on-line chef)<br>● Marriage burro<br>● Placement agency<br>● Event management | |
| | Technologies - JavaScript, JQuery, BootStrap, HTML 5, CSS3, Image Editing Tools (Photoshop, CorelDraw, Illustrator) etc. | |

**Main References:**

1. The Elements Of User Experience - User Centered Design For The Web And Beyond , Jesse James Garrett.
2. The UX Book - Process and Guidelines for Ensuring a Quality User Experience, Rex Hartson, Pardha S. Pyla, Morgan Kaufmann.
3. Observing the User Experience - A Practitioner's Guide to User Research, Elizabeth Goodman, Mike Kuniavsky, Andrea Moed - Morgan Kaufmann.
4. The Essentials of Interaction Design, Alan Cooper, Robert Reimann, David Cronin, Christopher Noessel with Jason Csizmadi, and Doug LeMoine, 4th Edition, Wiley.

**Additional References:**

1. Interaction Design Beyond Human–Computer Interaction, Preece, Sharp & Rogers, 4th Edition, Wiley.
2. Designing with the Mind in Mind - Simple Guide to Understanding User Interface Design Guidelines, Jeff Johnson, 2nd Edition, Morgan Kaufmann.
3. Designing Interfaces, Jenifer Tidwell, 2nd Edition, O'Reilly.

**Course Code: RPSIT303**
**Course Title: ADVANCED IOT**
**Academic Year: 2023-24**

Course Outcomes:

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Identify and Define the Industrial Internet of Things. |
| CO 2 | Design the prototype and give solutions for the real world problems. |
| CO 3 | Develop smart applications with the help of smart devices. |
| CO 4 | Demonstrate the implementation of IoT based applications in Cloud. |
| CO 5 | Propose and apply automation in industry. |

| **COURSE CODE RPSIT303** | **COURSE NAME ADVANCED IoT** | **CREDITS 4 LECTURES** |
|---|---|---|
| UNIT I | **IoT Ecosystems Concepts and Architecture:** Internet of Things An Overview, Open Source Semantic Web Infrastructure for Managing IoT Resources in the Cloud, Device/Cloud Collaboration Framework for Intelligence Applications, Fog Computing: Principles, Architectures and Applications, Programming Frameworks For Internet Of Things, Security And Privacy In The Internet Of Things, Cloud-Based Smart-Facilities Management. | 15 L |
| UNIT II | **Industrial Internet of Things:** Introduction to the Industrial Internet, Industrial Internet Use-Cases, The Technical and Business Innovators of the Industrial Internet, IIoT Reference Architecture, Designing Industrial Internet Systems, Examining the Access Network Technology and Protocols, Examining the Middleware Transport Protocols. | 15 L |
| UNIT III | **Software's, Protocols and Technologies:** Middleware Software Patterns, Software Design Concepts, Middleware Industrial Internet of Things Platforms, IIoT WAN Technologies and Protocols, Securing the Industrial Internet, Introducing Industry 4.0, Getting From Here to There: A Roadmap. | 15 L |
| UNIT IV | **Edge Computing & IoT Applications:** Defining IOt Analytics & Challenges, IoT Analytics for Cloud, Creating an AWS Cloud Analytics Environment, Collecting All that Data - Strategies & Techniques,<br>**IoT Applications:** Smart Metering/Advanced Metering Infrastructure, e-Health/Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking (Following and Monitoring Mobile Objects), Over-The-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications, Smart Factories. | 15 L |

**Course Code: RPSITP303**
**Course Title: PRACTICALS OF ADVANCED IOT**

**Academic Year: 2023-24**

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Demonstrate the deep understanding of advanced IOT architectures. |
| CO 2 | Choose various IoT devices, sensors, actuators for solving real world problems. |
| CO 3 | Use IoT devices and integrate data with cloud platforms. |

| **COURSE CODE RPSITP303** | **COURSE NAME PRACTICAL OF RPSIT303 (ADVANCED IoT)** | **CREDITS 2** |
|---|---|---|
| 1 | Interfacing Sensors (Gas,Water,Fire,Touch etc). Relay Board and Communication with telegram and Display status on 16x2 LCD ie M2M Communication | |
| 2 | Interfacing Temperature and Humidity sensor with Cloud and Sending Tweet if temperature and Humidity are beyond set range | |
| 3 | Python Flask Server<br>Trigger a set of led Gpios on the pi via a Python Flask web server | |
| 4 | MQTT connecting Pis Setup a Mosquito MQTT server and client and write a Python script to communicate data between Pi's And MQTT GYRO Interface with an Accelerometer Gyro Mpu6050 on the i2c bus and send sensor values over the internet via mqtt. | |
| 5 | Design Intruder using PIR Sensor and Pi Camera which send Email when Someone is on Door | |
| 6 | Design App to Communicate with Device connected to RPi and Display Status of Sensor on App | |
| 7 | Using NodeMCU Design Sensor Node, Collect information using Raspberry Pi and Display on Cloud | |
| 8 | Voice Control of Devices using Blynk, IFTTT and Webhooks | |

| | |
|---|---|
| 9 | Working with IoT cloud platforms - IBM Watson, Google IoT, AWS IoT etc |
| 10 | Exploring IoT Simulation Environment |

**Main References:**

1. Internet of Things Principles and Paradigm, Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufman
2. Industry 4.0 - The Industrial Internet Of Things, Alasdair Gilchrist, Apress
3. Building The Internet of Things with IPv6 and MIPv6, Daniel Minoli, Wiley
4. Analytics for the Internet of Things, Andrew Minteer, Packt

**Additional References:**

- Interconnecting Smart Objects with IP The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kaufmann Publishers
- Getting Started with Raspberry Pi Zero, Richard Grimmett, Packt
- Getting Started with the Internet of Things, Cuno Pfister, O'Reilly

**Course Code: RPSITP304**
**Course Title: PROJECT**
**Academic Year: 2023-24**

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Demonstrate the ability to plan and manage projects effectively. |
| CO 2 | Develop problem-solving and critical thinking skills to solve real world problems. |
| CO 3 | Demonstrate proficiency in technical skills relevant to their chosen projects like programming languages and tools. |
| CO 4 | Develop research skills by conducting literature reviews, gathering and analysing relevant information. |

| **COURSE CODE RPSITP304** | **COURSE NAME PROJECT** | **CREDITS 6** |
|---|---|---|

The syllabus proposes project implementation as part of the semester–IV. The student is expected to give a presentation of the project proposed and get verified and sanctioned by the project guide. In addition, experimental setup, analysis of results, comparison with results of related works, conclusion and future prospects will be part of the project implementation. A student is expected to make a project implementation report and appear for a project viva. He or she needs to spend around 200-250 hours on the project implementation for which the student will be awarded 6 credits.

# SEMESTER - IV

Course Code: **RPSIT401A [DSE1]**
Course Title: **DEEP LEARNING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Understand fundamental concepts in deep learning. |
| CO 2 | Compare popular deep learning frameworks such as TensorFlow, PyTorch, or Keras to develop and train deep learning models. |
| CO 3 | Describe deep learning techniques to various real-world applications. |
| CO 4 | Solve real-world problems and work on deep learning projects, including problem formulation, data collection, model development. |

| **COURSE CODE** | **COURSE NAME** | **CREDITS** | **LECTURE/ WEEK** |
|---|---|---|---|
| RPSCS301 | RPSCS301:Deep Learning | 4 | 4 |
| UNITS | COURSE CONTENTS | | NO. OF LECTURES |

| | | |
|---|---|---|
| I | Deep Learning: Deep forward Networks: Gradient-Based Learning, Hidden Unit, Back-Propagation and Other Differentiation Algorithms. Regularization of Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations | 15 L |
| II | Convolution Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks. | 15 L |
| III | Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks. Applications: Large Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing | 15 L |
| IV | Deep Learning Research- Linear Factor Models: Probabilistic PCA and Factor Analysis, Independent Component Analysis (ICA), Slow Feature Analysis, Sparse Coding, Manifold Interpretation of PCA. Structured Probabilistic Models for Deep Learning: The Challenge of Unstructured Modeling, Using Graphs to Describe Model Structure, Sampling from Graphical Models, Advantages of Structured Modeling, Learning about Dependencies, Inference and Approximate Inference, The Deep Learning Approach to Structured Probabilistic Models | 15L |

Text book:

1. Deep Learning Ian Goodfellow, Yoshua Bengio, Aaron Courville (Adaptive Computation and Machine Learning series) MIT Press

Course Code: **RPSITP401A [DSE1]**
Course Title: **PRACTICAL OF DEEP LEARNING**

Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Use popular deep learning frameworks such as TensorFlow, PyTorch, or Keras to implement deep learning models and algorithms. |
| CO 2 | Develop trained deep learning models into production environments |
| CO 3 | Evaluate the performance of deep learning models using appropriate evaluation metrics and techniques. |

| **COURSE CODE RPSCSP401A** | **COURSE NAME RPSCSP401: PRACTICAL OF DEEP LEARNING** | **CREDITS 2** |
|---|---|---|
| 1 | Demonstrate the deep feedforward networks. | |
| 2 | Demonstrate Convolution networks using a deep learning model. | |
| 3 | Demonstrate Stochastic gradient descent (SGD) with Nesterov momentum | |
| 4 | Demonstrate recursive neural networks | |
| 5 | Demonstrate deep learning application for NLP | |
| 6 | Demonstrate Echo state networks | |
| 7 | Demonstrate Independent component analysis | |
| 8 | Demonstrate sampling from graph models. | |

Course Code: **RPSIT401B**
Course Title: **PENETRATION TESTING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Identify the core concepts related to computer software and hardware. |
| CO 2 | State vulnerabilities and provide solutions to them. |

| | |
|---|---|
| CO 3 | DEscribe various vulnerabilities in the network and systems. |
| CO 4 | Recognize various errors that users, administrators, and programmers can lead to exploitable insecurities. |
| CO 5 | Explain the legal issues and IT Laws laid down under Cyber Security. |

| **COURSE CODE RPSIT401 B** | **COURSE NAME PENETRATION TESTING** | **CREDITS 4 LECTURES** |
|---|---|---|
| I | Introduction to Ethical Hacking, System Fundamentals, Cryptography, Footprinting, Scanning, Enumeration | 15 L |
| II | System Hacking, Malware, Sniffers, Social Engineering, Denial of Service, Session Hijacking | 15 L |
| III | Web Servers & Applications, SQL Injection, Hacking Wi-Fi & Bluetooth, Mobile Devices, Evasion, Cloud Technologies & Security, Physical Security | 15 L |
| IV | Indian Cyber & Data Protection Law, Protection of Personal Data & EU Principles, Cyberspace Regulations & Role of United Nations. | 15 L |

Course Code: **RPSITP401B**
Course Title: **PRACTICAL OF PENETRATION TESTING**
Academic Year: 2023-24

| **Course Outcomes** | **After Completing this course student will be able to :** |
|---|---|
| CO 1 | Demonstrate penetration testing methodologies. |
| CO 2 | Use different tools to exploit system |
| CO 3 | Create reports, documents and give recommendations based on penetration testing. |

| COURSE CODE RPSITP401B | COURSE NAME PRACTICAL OF RPSIT401B (PENETRATION TESTING) | CREDITS 2 |
|---|---|---|
| | 1. Using Footprinting, Reconnaissance & Social Engineering tools<br>2. Using Network Scanning & Enumeration tools<br>3. Using System Hacking tools<br>4. Using Trojans, Backdoors, Viruses & Worms tools<br>5. Using tools for sniffing<br>6. Using tools for Web Hacking (webservers, session hijacking, sql injections)<br>7. Using tools for wireless hacking<br>8. Using tools for evading IDS, Firewalls<br>9. Using Cryptanalysis. | |

**ext Books:**

1. Ethical Hacking Study Guide, Sean-Philip Oriyano, Wiley Publishing
2. Hacking Exposed Network Security Secrets & Solutions, Stuart McClure, Joel Scambray
3. The Indian Cyber Law, Suresh T. Vishwanathan, Bharat Law House, New Delhi

Course Code: **RPSITP402**
Course Title: **INTERNSHIP**
Academic Year: 2023-24

| Course Outcomes | After Completing this course student will be able to : |
|---|---|
| CO 1 | Apply theoretical knowledge gained from the academic course-work. |
| CO 2 | Develop professional skills required in a professional work environment. |
| CO 3 | Create a network with professionals in their field for future career opportunities. |
| CO 4 | Develop a professional portfolio enhancing their competitiveness in the market. |

| **COURSE CODE RPSITP402** | **COURSE NAME**<br>**INTERNSHIP** (**Approx.** 600-650 **hrs)** | **CREDITS 18** |
|---|---|---|

The syllabus proposes an internship for about 600-650 hours to be done by a student. It is expected that a student chooses an IT or IT-related industry and formally works as a full time intern during the period. The student should give a presentation of the internship subject as the part of internship evaluation with proper documentation of the attendance and the type of work he or she has done in the chosen organization. Proper certification (as per the guidelines given) by the person, to whom the student was reporting, with the Organization's seal should be attached as part of the documentation. Students will be awarded 14 credits for the entire internship along with the final presentation in front of the examiners.

## MSc Part II (Sem III & IV) EVALUATION SCHEME

**THEORY**

**Internal Exam - 40 Marks**

1. **20 Marks -- MCQ Test:**

Test will be taken based on any of the unit/units as informed by the faculty in-charge.

1. **20 Marks –**

Assignments based on syllabus or any other topic in demand based on syllabus.

**Note: Students have to acquire at least 40% marks in each paper individually.**

**External Examination- 60%- 60 Marks**

**Semester End Theory Examination: (Deviation from the usual modality)**

**External Examination - 60 Marks Duration 2½ Hrs**

- **Pandemic changes**
  - MCQ

Theory Question Paper Pattern:-

| **All Questions are Compulsory** | | |
|---|---|---|
| **Questions** | **Based On** | **Marks** |
| Q1 | Unit I | 12 |
| Q2 | Unit II | 12 |
| Q3 | Unit III | 12 |
| Q4 | Unit IV | 12 |
| Q5 | MIX | 12 |

-

- **Each Question will have 3 sub-questions carrying 6 marks each, out of which student has to answer any 2.**

**Note: Students have to acquire at least 40% marks in each paper individually.**

PRACTICAL

**Internal Exam - 20 Marks**

**1. Innovative Practical -- 10 Marks**

1. It can be clubbed with assignment.
2. Research paper review to be done for an application.

**2. Regularity -- 10 Marks**

1. Timely submission of practical's on the Google classroom.
2. Attendance should be 75%.
3. Submission of e-journal on time.

**Note: Students have to acquire at least 40% marks in each paper individually.**

**External Examination - 30 Marks Practical Question -**

- 1 or 2 questions can be asked in the practical exam for each paper.
- External will be called for evaluating the same.

- **Pandemic changes**
  - MCQ, Viva, Written submission.

**Note:**

1. **Students who have submitted their e-Journal and certified are only allowed to appear for the exam.**
2. **Students have to acquire at least 40% marks in each paper individually.**

**PROJECT EVALUATION - 150 Marks**

**Internal evaluation - 60 Marks**

- Abstract submission & literature Survey / sample data collection - 10 Marks
- Technology Implementation - 10 marks
- Mid-Term Presentation - 20 Marks
- Project Documentation- 20 marks

**External evaluation - 90 Marks**

- Project Quality - 20 Marks.
- Project Implementation - 40 Marks.

- Presentation - 30 Marks.

**A Student should submit project implementation report with following details:**

1. **Title:** Title of the project.
2. **Implementation details:** A description of how the project has been implemented. It shall be of 2 to 4 pages.
3. **Experimental set up and results:** A detailed explanation on how experiments were conducted, what software used and the results obtained. Details like screen shots, tables and graphs can come here. It shall be of 6 to 10 pages.
4. **Analysis of the results:** A description on what the results means and how they have been arrived at. Different performing measures or statistical tools used etc may be part of this. It shall be of 4 to 6 pages.
5. **Conclusion:** A conclusion of the project performed in terms of its outcome (May be half a page).
6. **Future enhancement:** A small description on what enhancement can be done when more time and resources are available (May be half a page).
7. **Program code:** The program code may be given as appendix.

**Note:**

1. **Students have to acquire at least 40% marks in project evaluation.**
2. **Internal evaluation will be done by the Project guide allotted.**
3. **Timely submission on google classroom as per requirement is must, regularity will be determined based on that.**
4. **Attendance should be 75%.**

**INTERNSHIP EVALUATION - 450 Marks**

**Internal evaluation - 180 Marks**

**Following are the guidelines for evaluation:**

1. Job description : 20 Marks
2. Technical knowledge/skills : 40 Marks
3. Innovation & creativity : 40 Marks
4. Adherence to Schedule ( weekly activity report) : 20 Marks
5. Soft Skills (Communication, Team work, Resource Management, Leadership qualities) : 40 Marks
6. Discipline & behavior : 20 Marks

**External evaluation - 270 Marks (50% by employer & 50% by external examiner)**

On the basis of the detailed internship report submitted by the student duly signed by the employer and the internal faculty. A presentation is expected from the student for sharing his / her learning experience and work done at the internship.

**Following are the guidelines for evaluation:**

1. Internship Report : 30 Marks
2. Innovation and creativity : 50 Marks
3. Experience based learning : 50 Marks
4. Viva : 20 Marks
5. Internship Genuineness : 20 Marks
6. Soft Skills : 30 Marks
7. Suitability & Clarity of material presented : 30 Marks
8. Quality of oral presentation : 40 Marks

**Note: - Students need to find Internship by themselves. It's their responsibility.**

**Following things are expected to be completed by the student for the final evaluation.**

1) The syllabus proposes an internship for about 600 hours to be done by a student.
2) It is expected that a student chooses an IT or IT-related industry and formally works as a full time intern during the period.
3) Evaluation will be done based on the feedback given by the employers about the student.
4) The student should subject oneself with an internship evaluation with proper documentation of the attendance and the type of work he or she has done in the chosen organization.

Following are the guidelines laid for the same

1) Internship joining Letter with proper job description.
2) Weekly Report in Excel format to be shown every week to Internal In-charge
   - Start date
   - End date
   - Task Assigned
   - Task completed
   - Outcome / Learning's
3) Internship completion Letter with proper hours & task completed.
4) Employer Feedback Form is prepared to assess based on the following:
   - Skills/ Knowledge
   - Self-Management
   - Dependability
   - Attitude
   - Relationships
5) Internship report :
   - Organization Overview
   - Description (Role, Activities, Technology Used, Live project link or screenshots)
   - SWOT Analysis
   - Introspection (knowledge acquired, Skills learned, challenging task performed)
   - Employers Feedback.

6) Proper certification by the person, to whom the student was reporting, with Organization's seal should be attached as part of the documentation.

Note: - Students need to find Internship by themselves. It's their responsibility

**PASSING CRITERIA 40%:** - Students must acquire a minimum of 40% marks in each course individually (Theory, Practical, Project & Internship).