

### SEMESTER V

| S. NO.            | COURSE CODE | COURSE TITLE                              | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS     |
|-------------------|-------------|---|----------|------------------|---|---|-----------------------|-------------|
|                   |             |   |          | L                | T | P |                       |             |
| <b>THEORY</b>     |             |   |          |                  |   |   |                       |             |
| 1.                | EC3492      | Digital Signal Processing                 | PCC      | 3                | 0 | 2 | 5                     | 4           |
| 2.                | CS3591      | Computer Networks                         | PCC      | 3                | 0 | 2 | 5                     | 4           |
| 3.                | CS3551      | Distributed Computing                     | PCC      | 3                | 0 | 0 | 3                     | 3           |
| 4.                | CB3491      | Cryptography and Cyber Security           | PCC      | 3                | 0 | 0 | 3                     | 3           |
| 5.                |             | Professional Elective I                   | PEC      | -                | - | - | -                     | 3           |
| 6.                |             | Professional Elective II                  | PEC      | -                | - | - | -                     | 3           |
| 7.                |             | Mandatory Course-I <sup>&amp;</sup>       | MC       | 3                | 0 | 0 | 3                     | 0           |
| <b>PRACTICALS</b> |             |   |          |                  |   |   |                       |             |
| 8.                | IT3681      | Mobile Application Development Laboratory | PCC      | 0                | 0 | 3 | 3                     | 1.5         |
| <b>TOTAL</b>      |             |   |          | -                | - | - | -                     | <b>21.5</b> |

<sup>&</sup> Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

### SEMESTER VI

| S. NO.        | COURSE CODE | COURSE TITLE                           | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS        |
|---------------|-------------|--|----------|------------------|---|---|-----------------------|----------------|
|               |             |  |          | L                | T | P |                       |                |
| <b>THEORY</b> |             |  |          |                  |   |   |                       |                |
| 1.            | CCS356      | Object Oriented Software Engineering   | PCC      | 3                | 0 | 2 | 5                     | 4              |
| 2.            | ET3491      | Embedded Systems and IoT Design        | PCC      | 3                | 0 | 2 | 5                     | 4              |
| 3.            |             | Open Elective – I <sup>*</sup>         | OEC      | 3                | 0 | 0 | 3                     | 3              |
| 4.            |             | Professional Elective III              | PEC      | -                | - | - | -                     | 3              |
| 5.            |             | Professional Elective IV               | PEC      | -                | - | - | -                     | 3              |
| 6.            |             | Professional Elective V                | PEC      | -                | - | - | -                     | 3              |
| 7.            |             | Professional Elective VI               | PEC      | -                | - | - | -                     | 3              |
| 8.            |             | Mandatory Course-II <sup>&amp;</sup>   | MC       | 3                | 0 | 0 | 3                     | 0              |
| 9.            |             | NCC Credit Course Level 3 <sup>#</sup> |          | 3                | 0 | 0 | 3                     | 3 <sup>#</sup> |
| <b>TOTAL</b>  |             |  |          | -                | - | - | -                     | <b>23</b>      |

<sup>\*</sup>Open Elective – I Shall be chosen from the list of open electives offered by other Programmes

<sup>&</sup> Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

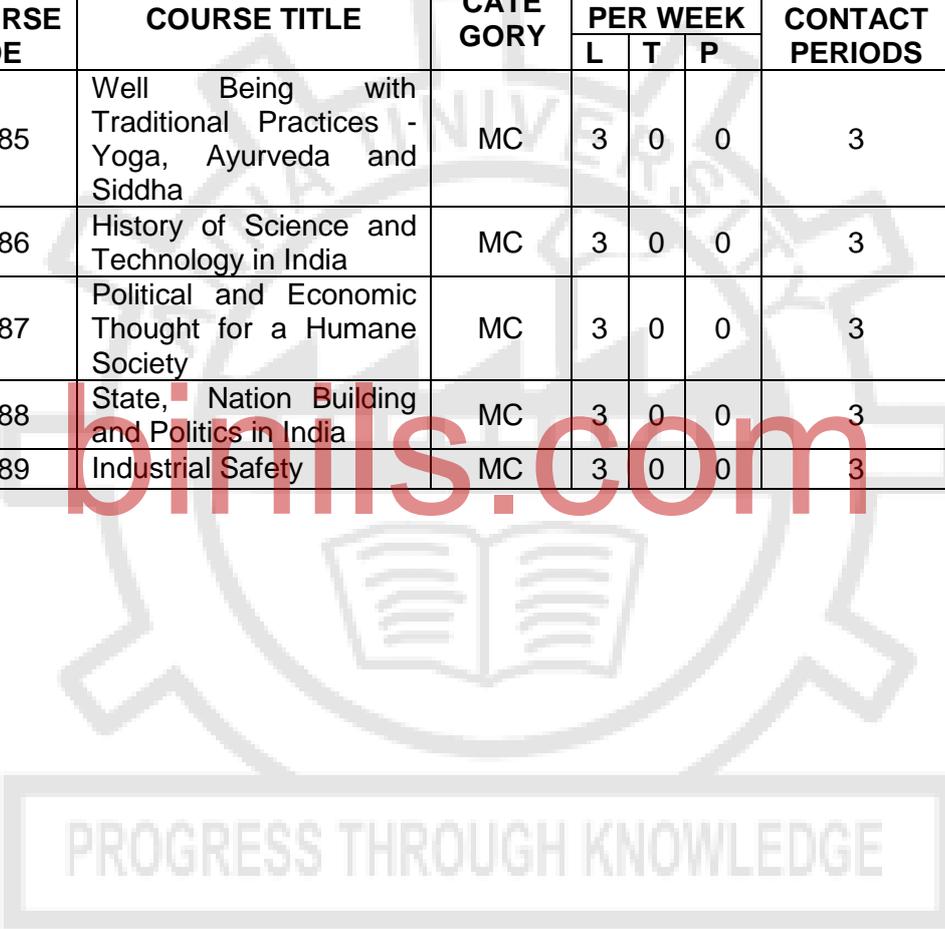
<sup>#</sup> NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

**MANDATORY COURSES I**

| S. NO. | COURSE CODE | COURSE TITLE                             | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|--|----------|------------------|---|---|-----------------------|---------|
|        |             |  |          | L                | T | P |                       |         |
| 1.     | MX3081      | Introduction to Women and Gender Studies | MC       | 3                | 0 | 0 | 3                     | 0       |
| 2.     | MX3082      | Elements of Literature                   | MC       | 3                | 0 | 0 | 3                     | 0       |
| 3.     | MX3083      | Film Appreciation                        | MC       | 3                | 0 | 0 | 3                     | 0       |
| 4.     | MX3084      | Disaster Risk Reduction and Management   | MC       | 3                | 0 | 0 | 3                     | 0       |

**MANDATORY COURSES II**

| S. NO. | COURSE CODE | COURSE TITLE  | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|---|----------|------------------|---|---|-----------------------|---------|
|        |             |   |          | L                | T | P |                       |         |
| 1.     | MX3085      | Well Being with Traditional Practices - Yoga, Ayurveda and Siddha | MC       | 3                | 0 | 0 | 3                     | 0       |
| 2.     | MX3086      | History of Science and Technology in India                        | MC       | 3                | 0 | 0 | 3                     | 0       |
| 3.     | MX3087      | Political and Economic Thought for a Humane Society               | MC       | 3                | 0 | 0 | 3                     | 0       |
| 4.     | MX3088      | State, Nation Building and Politics in India                      | MC       | 3                | 0 | 0 | 3                     | 0       |
| 5.     | MX3089      | Industrial Safety   | MC       | 3                | 0 | 0 | 3                     | 0       |



PROGRESS THROUGH KNOWLEDGE

### VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

| S. NO. | COURSE CODE | COURSE TITLE                  | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|-------------------------------|----------|------------------|---|---|-----------------------|---------|
|        |             |                               |          | L                | T | P |                       |         |
| 1.     | CCS335      | Cloud Computing               | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 2.     | CCS372      | Virtualization                | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 3.     | CCS336      | Cloud Services Management     | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 4.     | CCS341      | Data Warehousing              | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 5.     | CCS367      | Storage Technologies          | PEC      | 3                | 0 | 0 | 3                     | 3       |
| 6.     | CCS365      | Software Defined Networks     | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 7.     | CCS368      | Stream Processing             | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 8.     | CCS362      | Security and Privacy in Cloud | PEC      | 2                | 0 | 2 | 4                     | 3       |

### VERTICAL 4: CYBER SECURITY AND DATA PRIVACY

| S. NO. | COURSE CODE | COURSE TITLE                               | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|--|----------|------------------|---|---|-----------------------|---------|
|        |             |  |          | L                | T | P |                       |         |
| 1.     | CCS344      | Ethical Hacking                            | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 2.     | CCS343      | Digital and Mobile Forensics               | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 3.     | CCS363      | Social Network Security                    | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 4.     | CCS351      | Modern Cryptography                        | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 5.     | CB3591      | Engineering Secure Software Systems        | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 6.     | CCS339      | Cryptocurrency and Blockchain Technologies | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 7.     | CCS354      | Network Security                           | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 8.     | CCS362      | Security and Privacy in Cloud              | PEC      | 2                | 0 | 2 | 4                     | 3       |

**VERTICAL 5: CREATIVE MEDIA**

| S. NO. | COURSE CODE | COURSE TITLE                            | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|---|----------|------------------|---|---|-----------------------|---------|
|        |             |   |          | L                | T | P |                       |         |
| 1.     | CCS333      | Augmented Reality/Virtual Reality       | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 2.     | CCS352      | Multimedia and Animation                | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 3.     | CCS371      | Video Creation and Editing              | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 4.     | CCS370      | UI and UX Design                        | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 5.     | CCW332      | Digital Marketing                       | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 6.     | CCS373      | Visual Effects                          | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 7.     | CCS347      | Game Development                        | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 8.     | CCS353      | Multimedia Data Compression and Storage | PEC      | 2                | 0 | 2 | 4                     | 3       |

**VERTICAL 6: EMERGING TECHNOLOGIES**

| S. NO. | COURSE CODE | COURSE TITLE                               | CATEGORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|--|----------|------------------|---|---|-----------------------|---------|
|        |             |  |          | L                | T | P |                       |         |
| 1.     | CCS333      | Augmented Reality/Virtual Reality          | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 2.     | CCS361      | Robotic Process Automation                 | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 3.     | CCS355      | Neural Networks and Deep Learning          | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 4.     | CCS340      | Cyber Security                             | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 5.     | CCS359      | Quantum Computing                          | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 6.     | CCS339      | Cryptocurrency and Blockchain Technologies | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 7.     | CCS347      | Game Development                           | PEC      | 2                | 0 | 2 | 4                     | 3       |
| 8.     | CCS331      | 3D Printing and Design                     | PEC      | 2                | 0 | 2 | 4                     | 3       |

### OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

#### OPEN ELECTIVES – I

| S. NO. | COURSE CODE | COURSE TITLE   | CATE GORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|--|-----------|------------------|---|---|-----------------------|---------|
|        |             |  |           | L                | T | P |                       |         |
| 1.     | OAS351      | Space Science  | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 2.     | OIE351      | Introduction to Industrial Engineering                 | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 3.     | OBT351      | Food, Nutrition and Health                             | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 4.     | OCE351      | Environment and Social Impact Assessment               | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 5.     | OEE351      | Renewable Energy System                                | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 6.     | OEI351      | Introduction to Industrial Instrumentation and Control | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 7.     | OMA351      | Graph Theory   | OEC       | 3                | 0 | 0 | 3                     | 3       |

#### OPEN ELECTIVES – II

| S. NO. | COURSE CODE | COURSE TITLE                        | CATE GORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|-------------------------------------|-----------|------------------|---|---|-----------------------|---------|
|        |             |                                     |           | L                | T | P |                       |         |
| 1.     | OIE352      | Resource Management Techniques      | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 2.     | OMG351      | Fintech Regulation                  | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 3.     | OFD351      | Holistic Nutrition                  | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 4.     | AI3021      | IT in Agricultural System           | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 5.     | OEI352      | Introduction to Control Engineering | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 6.     | OPY351      | Pharmaceutical Nanotechnology       | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 7.     | OAE351      | Aviation Management                 | OEC       | 3                | 0 | 0 | 3                     | 3       |

#### OPEN ELECTIVES – III

| S. NO. | COURSE CODE | COURSE TITLE                         | CATE GORY | PERIODS PER WEEK |   |   | TOTAL CONTACT PERIODS | CREDITS |
|--------|-------------|--------------------------------------|-----------|------------------|---|---|-----------------------|---------|
|        |             |                                      |           | L                | T | P |                       |         |
| 1.     | OHS351      | English for Competitive Examinations | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 2.     | OMG352      | NGOs and Sustainable Development     | OEC       | 3                | 0 | 0 | 3                     | 3       |
| 3.     | OMG353      | Democracy and Good Governance        | OEC       | 3                | 0 | 0 | 3                     | 3       |

- Develop a simple shopping application.
- Design a web server supporting push notifications.
- Develop an application by integrating Google maps
- Mini Projects involving Flutter/Kotlin multi-platform

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of this course, the student should be able to

- CO1:**Design and build simple mobile applications supporting multiple platforms.
- CO2:**Apply various programming techniques and patterns to build mobile applications.
- CO3:**Build real-time mobile applications for society/environment
- CO4:**Build gaming and multimedia based mobile applications
- CO5:**Build AI based mobile applications for society/environment following ethical practices

**TEXTBOOKS:**

1. Simone Alessandria, Flutter Projects: A practical project-based guide to building real-world cross-platform mobile applications and games, Packt publishing.
2. Carmine Zaccagnino, Programming Flutter: Native, Cross-Platform Apps the Easy Way (The Pragmatic Programmers), Packt publishing.

**REFERENCES**

1. Gergely Orosz, Building Mobile Applications at Scale:39 Engineering Challenges
2. Souvik Biswas & Codemagic, Flutter Libraries we love
3. ED Freitas, Daniel Jebaraj, Flutter Succinctly
4. Antonio Leiva, Kotlin for Android Developers Learn Kotlin the easy way while developing an Android Applications

**CO's-PO's & PSO's MAPPING**

| CO's        | PO's     |          |          |          |          |          |          |          |          |          |          |          | PSO's    |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|             | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 1        | 2        | 3        |
| 1           | 3        | 3        | 3        | 1        | 3        | 1        | 1        | 1        | 2        | 1        | 1        | 1        | 2        | 2        | 2        |
| 2           | 3        | 3        | 3        | 2        | 3        | 1        | 1        | 1        | 2        | 1        | 1        | 1        | 2        | 2        | 2        |
| 3           | 3        | 3        | 3        | 3        | 3        | 3        | 2        | 2        | 3        | 3        | 3        | 3        | 3        | 3        | 3        |
| 4           | 3        | 3        | 3        | 3        | 3        | 2        | 1        | 1        | 1        | 1        | 2        | 1        | 1        | 2        | 2        |
| 5           | 3        | 3        | 3        | 3        | 2        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 2        | 2        | 2        |
| <b>AVg.</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>2</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> |

1 - low, 2 - medium, 3 - high, '-' - no correlation

**CCS356**

**OBJECT ORIENTED SOFTWARE ENGINEERING**

**L T P C**

**3 0 2 4**

**COURSE OBJECTIVES:**

- To understand Software Engineering Lifecycle Models
- To Perform software requirements analysis
- To gain knowledge of the System Analysis and Design concepts using UML.
- To understand software testing and maintenance approaches
- To work on project management scheduling using DevOps

**UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9**  
Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Case Study.

**UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9**  
Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram- CASE TOOLS.

**UNIT III SOFTWARE DESIGN 9**  
Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Proxy – Facade – Architectural styles – Layered - Client Server - Tiered - Pipe and filter- User interface design-Case Study.

**UNIT IV SOFTWARE TESTING AND MAINTENANCE 9**  
Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking-Case Study

**UNIT V PROJECT MANAGEMENT 9**  
Software Project Management- Software Configuration Management - Project Scheduling- DevOps: Motivation-Cloud as a platform-Operations- Deployment Pipeline:Overall Architecture Building and Testing-Deployment- Tools- Case Study

**COURSE OUTCOMES:**

**CO1:** Compare various Software Development Lifecycle Models

**CO2:** Evaluate project management approaches as well as cost and schedule estimation strategies.

**CO3:** Perform formal analysis on specifications.

**CO4:** Use UML diagrams for analysis and design.

**CO5:** Architect and design using architectural styles and design patterns, and test the system

**PRACTICAL EXERCISES:**

**LIST OF EXPERIMENTS:**

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the usecase diagram
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.

**45 PERIODS**

**30 PERIODS**

10. Implement the modified system and test it for various scenarios.

**SUGGESTED DOMAINS FOR MINI-PROJECT:**

1. Passport automation system.
2. Book bank
3. Exam registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference management system
13. BPO management system
14. Library management system
15. Student information system

**TOTAL:75 PERIODS**

**TEXT BOOKS**

1. Bernd Bruegge and Allen H. Dutoit, "Object-Oriented Software Engineering: Using UML, Patterns and Java", Third Edition, Pearson Education, 2009.
2. Roger S. Pressman, Object-Oriented Software Engineering: An Agile Unified Methodology, First Edition, Mc Graw-Hill International Edition, 2014.

**REFERENCES**

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Len Bass, Ingo Weber and Liming Zhu, —DevOps: A Software Architect’s Perspectivell, Pearson Education, 2016
4. Rajib Mall, Fundamentals of Software Engineering, 3rd edition, PHI Learning Pvt. Ltd., 2009.
5. Stephen Schach, Object-Oriented and Classical Software Engineering, 8th ed, McGraw-Hill, 2010.

**CO's-PO's & PSO's MAPPING**

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

**COURSE OBJECTIVES:**

- To learn the internal architecture and programming of an embedded processor.
- To introduce interfacing I/O devices to the processor.
- To introduce the evolution of the Internet of Things (IoT).
- To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platform.
- To apply the concept of Internet of Things in real world scenario.

|   |   |          |
|---|---|----------|
| <b>UNIT I</b>   | <b>8-BIT EMBEDDED PROCESSOR</b>             | <b>9</b> |
| 8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.  |   |          |
| <b>UNIT II</b>  | <b>EMBEDDED C PROGRAMMING</b>               | <b>9</b> |
| Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS – Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies.   |   |          |
| <b>UNIT III</b>   | <b>IOT AND ARDUINO PROGRAMMING</b>          | <b>9</b> |
| Introduction to the Concept of IoT Devices – IoT Devices Versus Computers – IoT Configurations – Basic Components – Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino. |   |          |
| <b>UNIT IV</b>  | <b>IOT COMMUNICATION AND OPEN PLATFORMS</b> | <b>9</b> |
| IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.   |   |          |
| <b>UNIT V</b>   | <b>APPLICATIONS DEVELOPMENT</b>             | <b>9</b> |
| Complete Design of Embedded Systems – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.  |   |          |

PROGRESS THROUGH KNOWLEDGE

**45 PERIODS****PRACTICAL EXERCISES:****30 PERIODS**

1. Write 8051 Assembly Language experiments using simulator.
2. Test data transfer between registers and memory.
3. Perform ALU operations.
4. Write Basic and arithmetic Programs Using Embedded C.
5. Introduction to Arduino platform and programming
6. Explore different communication methods with IoT devices (Zigbee, GSM, Bluetooth)
7. Introduction to Raspberry PI platform and python programming
8. Interfacing sensors with Raspberry PI
9. Communicate between Arduino and Raspberry PI using any wireless medium
10. Setup a cloud platform to log the data

11. Log Data using Raspberry PI and upload to the cloud platform
12. Design an IOT based system

**COURSE OUTCOMES:**

- CO1:** Explain the architecture of embedded processors.  
**CO2:** Write embedded C programs.  
**CO3:** Design simple embedded applications.  
**CO4:** Compare the communication models in IOT  
**CO5:** Design IoT applications using Arduino/Raspberry Pi /open platform.

**TOTAL PERIODS:75**

**TEXTBOOKS**

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second Edition, 2014
2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.

**REFERENCES**

1. Michael J. Pont, "Embedded C", Pearson Education, 2007.
2. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
3. Andrew N Sloss, D. Symes, C. Wright, "Arm System Developer's Guide", Morgan Kauffman/ Elsevier, 2006.
4. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015

**CO's- PO's & PSO's MAPPING**

| CO's        | PO's |   |   |     |     |   |   |   |   |     |     |     | PSO's |     |     |
|-------------|------|---|---|-----|-----|---|---|---|---|-----|-----|-----|-------|-----|-----|
|             | 1    | 2 | 3 | 4   | 5   | 6 | 7 | 8 | 9 | 10  | 11  | 12  | 1     | 2   | 3   |
| 1           | 3    | 3 | 3 | 3   | -   | - | - | - | 1 | 2   | 3   | 3   | 2     | 1   | 3   |
| 2           | 2    | 1 | 3 | 2   | 2   | - | - | - | 1 | 2   | 2   | 3   | 3     | 1   | 3   |
| 3           | 3    | 1 | 3 | 3   | 1   | - | - | - | 1 | 2   | 1   | 1   | 1     | 3   | 3   |
| 4           | 3    | 2 | 3 | 2   | 1   | - | - | - | 1 | 2   | 2   | 3   | 2     | 2   | 1   |
| 5           | 2    | 3 | 3 | 2   | 2   | - | - | - | 1 | 3   | 3   | 2   | 3     | 1   | 3   |
| <b>AVg.</b> | 2.6  | 2 | 3 | 2.4 | 1.5 | - | - | - | 1 | 2.2 | 2.2 | 2.4 | 2.2   | 1.6 | 2.6 |

1 - low, 2 - medium, 3 - high, '-' - no correlation

**NCC Credit Course Level 3\***

**NX3651**

**(ARMY WING) NCC Credit Course - III**

**L T P C**  
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**PERSONALITY DEVELOPMENT**

**9**

- |      |  |   |
|------|--|---|
| PD 3 | Group Discussion: Team Work                          | 2 |
| PD 4 | Career Counselling, SSB Procedure & Interview Skills | 3 |
| PD 5 | Public Speaking 4                                    |   |