# Indra Ganesan
## COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

# NAAC DOCUMENTS

## QUALITY INDICATOR FRAME WORK

## CRITERION – 2

# TEACHING-LEARNING AND EVALUATION

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING

| Criteria 2 | Teaching-Learning and Evaluation | 350 |
|---|---|---|

## Key Indicator-2.6 Student Performances and Learning Outcome (90)

**2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all programmes offered by the institution are stated and displayed on website**

# DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING...R2013

**INDRA GANESAN COLLEGE OF ENGINEERING**
**IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India**
**(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

## REGULATION -2013

## COURSE OUTCOMES

## SEM – V

### C301- EC6501 Digital Communication

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C301.1 | Design PCM systems | 1,2,9,12 | - |
| C301.2 | Design and implement baseband transmission schemes | 1,2,9,12 | - |
| C301.3 | Design and implement bandpass signaling schemes | 1,2,9,12 | - |
| C301.4 | Analyze the spectral characteristics of bandpass signaling schemes and heir noise performance | 1,2,9,12 | - |
| C301.5 | Explain the different types of Digital communication schemes | 1,2,9,12 | - |
| C301.6 | Design error control coding schemes | 1,2,9,12 | - |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C301.1 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301.2 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301.3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301.4 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301.5 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301.6 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |
| C301 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | - | - | - |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

## C302- EC6502 PRINCIPLES OF DIGITAL SIGNAL PROCESSING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C302.1 | Apply DFT for the analysis of digital signals & systems | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C302.2 | Design IIR filters | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C302.3 | Design FIR filters | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C302.4 | Characterize finite Word length effect on filters | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C302.5 | Design the Multirate Filters | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C302.6 | Apply Adaptive Filters to equalization | 1,2,3,4,6,9,10,11,12 | 1,3 |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C302.1 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302.2 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302.3 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302.4 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302.5 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302.6 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |
| C302 | 3 | 3 | 2 | 2 | - | 1 | - | - | 1 | 2 | 1 | 1 | 2 | - | 2 |

## C303- EC6503 TRANSMISSION LINES AND WAVE GUIDES

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C303.1 | Discuss the propagation of signals through transmission lines. | 1,2,3,4,6,9,10,11,12 | 1,3 |
| C303.2 | Analyze signal propagation at Radio frequencies. | 1,2,3,4,5,6,12 | 2,3 |
| C303.3 | Explain radio propagation in Parallel Planes . | 1,2,3,4,5,6,12 | 2,3 |

Dr. G. Balakrishnan, M.E., Ph.D.
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | |
|---|---|---|---|
| C303.4 | Explain radio propagation in Rectangular Wave guide. | 1,2,3,4,5,6,12 | 2,3 |
| C303.5 | Explain radio propagation in Circular Wave guide. | 1,2,3,4,5,6,12 | 2,3 |
| C303.6 | Utilize cavity resonators. | 1,2,3,4,5,6,12 | 2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C303.1 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| C303.2 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| C303.3 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| C303.4 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| C303.5 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| C303.6 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | - | 3 | 1 |
| **C303** | **3** | **3** | **3** | **3** | **3** | **2** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **1** |

## C304 - GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C304.1 | Find and implement scientific, technological, economic and political solutions to environmental problems. | 1,2,3,4,5,6,12 | 1,2,3 |
| C304.2 | Study the interrelationship between living organism and environment | 1,2,3,4,5,6,12 | 1,2,3 |
| C304.3 | Appreciate the importance of environment by assessing its impact on the human world envision the surrounding environment, its functions and its value. | 1,2,3,4,5,6,12 | 1,2,3 |
| C304.4 | To study the dynamic processes and understand the features of the earth"s interior and surface. | 1,2,3,4,5,6,12 | 1,2,3 |
| C304.5 | Study the integrated themes and biodiversity, natural resources, pollution control and waste management | 1,2,3,4,5,6,12 | 1,2,3 |
| C304.6 | Apply them for suitable technological advancement and societal development. | 1,2,3,4,5,6,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C304. | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | | | | | | | | | | | | | | | |
| **C304.2** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **C304.3** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **C304.4** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **C304.5** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **C304.6** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **C304** | **3** | **3** | **3** | **3** | **2** | **2** | - | - | - | - | - | **1** | **2** | **1** | **1** |

## C305- EC6504 MICROPROCESSOR AND MICROCONTROLLER

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| **C305.1** | Study the Architecture of 8086 microprocessor. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C305.2** | Write Assembly Language Programs. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C305.3** | Learn the design aspects of I/O and Memory Interfacing circuits. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C305.4** | Interface microprocessors with supporting chips. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C305.5** | Study the Architecture of 8051 microcontroller. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C305.6** | Design a microcontroller based system. | 1,2,3,4,5,6,11,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C305.1** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305.2** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305.3** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305.4** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305.5** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305.6** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 3 | 3 |
| **C305** | **3** | **3** | **3** | **3** | **2** | **2** | - | - | - | - | **2** | **3** | **3** | **3** |

## C306- EC6511 DIGITAL SIGNAL PROCESSING LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | |
|---|---|---|---|
| C306.1 | Carry out simulation of DSP systems | 1,2,3,4,6,11,12 | 1,2,3 |
| C306.2 | Demonstrate their abilities towards DSP processor based implementation of DSP systems | 1,11,12 | 1,2,3 |
| C306.3 | Analyze Finite word length effect on DSP systems• | 1,2,3,4,6,11,12 | 1,2,3 |
| C306.4 | Demonstrate the applications of FFT to DSP | 1,11,12 | 1,2,3 |
| C306.5 | Implement adaptive filters for various applications of DSP | 1,2,3,4,6,11,12 | 1,2,3 |
| C306.6 | Apply DFT for the analysis of digital signals and systems | 1,2,11,12 | 1,2,11,12 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C306.1 | 3 | 3 | | 1 | - | 2 | - | - | - | - | 3 | 3 | 3 | 3 | 2 |
| C306.2 | 3 | - | - | - | - | - | - | - | - | - | 3 | 1 | 3 | 3 | 2 |
| C306.3 | 3 | 3 | 3 | 2 | - | 2 | - | - | - | - | 3 | 2 | 3 | 3 | 2 |
| C306.4 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | 3 | 3 | 2 |
| C306.5 | 3 | 3 | 3 | 3 | - | 2 | - | - | - | - | 3 | 2 | 3 | 3 | 2 |
| C306.6 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 2 | 3 | 3 | 2 |
| C306 | 3 | 2 | 1 | 1 | | 1 | - | - | - | - | 3 | 2 | 3 | 3 | 2 |

## C307- EC6512 COMMUNICATION SYSTEMS LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C307.1 | Visualize the effects of sampling and TDM | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C307.2 | Implement AM & FM modulation and demodulation | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C307.3 | Implement PCM & DM | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C307.4 | Implement FSK, PSK and DPSK schemes | 1,2,5,6,11,12 | 1,2,3 |
| C307.5 | Implement Equalization algorithms | 1,2,3,5,6,11,12 | 1,2,3 |
| C307.6 | Implement Error control coding schemes | 1,2,3,4,5,6,11,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Cour | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO1 | PO1 | PO1 | PSO | PSO | PSO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| se | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C307.1 | 2 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307.2 | 2 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307.3 | 2 | 2 | 2 | 3 | 1 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307.4 | 2 | 2 | - | - | 3 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307.5 | 2 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307.6 | 2 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |
| C307 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 1 |

## C208- EC6513 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C308.1 | Write ALP Programmes for fixed and Floating Point and Arithmetic | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C308.2 | Interface different I/Os with processor | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C308.3 | Generate waveforms using Microprocessors | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C308.4 | Execute Programs in 8051 | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C308.5 | Explain the difference between simulator and Emulator | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C308.6 | Be familiar with MASM | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C308.1 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |
| C308.2 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C308.3 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |
| C308.4 | 2 | 3 | 1- | 2 | 1 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |
| C308.5 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |
| C308.6 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |
| C308 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 3 |

## C309- MG6851 PRINCIPLES OF MANAGEMENT

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C309.1 | Sketch the Evolution of Management. | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C309.2 | Extract the functions and principles of management | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C309.3 | Learn the application of the principles in an organization | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C309.4 | Study the various HR related activities. | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C309.5 | Analyze the position of self and company goals towards business. | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |
| C309.6 | managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of managemen | 1,2,3,4,5,6,7,9,10,11,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C309.1 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309.2 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309.3 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309.4 | 2 | 3 | 1- | 2 | 1 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309.5 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309.6 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| C309 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | - | 1 | 2 | 1 | 3 | 2 | 2 | 2 |

## C310- CS6303 COMPUTER ARCHITECTURE

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C310.1 | Design arithmetic and logic unit. | 1,2,3,4,5,6,7,11,12 | 2 |
| C310.2 | Design and anlayse pipelined control units. | 1,2,3,4,5,6,7,10,11,12 | 2 |
| C310.3 | Evaluate performance of memory systems. | 1,2,3,4,5,6,7,10,11,12 | 2 |
| C310.4 | Explain the parallel processing architectures. | 1,2,3,4,5,6,7,10,11,12 | 2 |
| C310.5 | expose the students with different ways of communicating with I/O devices and standard I/O interfaces. | 1,2,3,4,5,6,7,10,11,12 | 2 |
| C310.6 | Explain the hierarchical memory system including cache memories and virtual memory. | 1,2,3,4,5,6,7,10,11,12 | 2 |

## Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C310.1 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | - | 2 | - | 1 | - |
| C310.2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |
| C310.3 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |
| C310.4 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |
| C310.5 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |
| C310.6 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |
| C310 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | - | 1 | - |

## C311- CS6551 COMPUTER NETWORKS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C311.1 | Explain the Network Models,layers and functions. | 1,2,3,4,5,6,7,10,12 | 1,2,3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | |
|---|---|---|---|
| C311.2 | Categorize and classify the routing protocols. | 1,2,3,4,5,6,7,10,11,12 | 1,2,3 |
| C311.3 | List the functions of the transport and application layer. | 1,2,3,4,5,6,7,10,11,12 | 1,2,3 |
| C311.4 | Evaluate and choose the network security mechanisms. | 1,2,3,4,5,6,7,10,11,12 | 1,2,3 |
| C311.5 | Discuss the hardware security attacks and counter measures. | 1,2,3,4,5,6,7,10,11,12 | 1,2,3 |
| C311.6 | Data encryption and decryption using RSA (Rivest,Shamir and Adleman) algorithm. | 1,2,3,4,5,6,7,10,11,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C311.1 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | - | 2 | 2 | 2 | 2 |
| C311.2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| C311.3 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| C311.4 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| C311.5 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| C311.6 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |
| C311 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 2 | 2 | 2 | 2 |

## C312- EC6601 VLSI DESIGN

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C312.1 | In depth knowledge of MOS technology | 1,2,3,4,11,12 | 1,2,3 |
| C312.2 | Explain the Combinational Logic Circuits and Design Principles | 1,2,3,4,11,12 | 1,2,3 |
| C312.3 | Explain Sequential Logic Circuits and Clocking Strategies | 1,2,3,4,11,12 | 1,2,3 |
| C312.4 | Explain the Memory architecture and building blocks | 1,2,3,4,11,12 | 1,2,3 |
| C312.5 | Apply the ASIC Design Process and Testing | 1,2,3,4,11,12 | 1,2,3 |
| C312.6 | Design using Programmable Devices (ROM, PLA, FPGA), | 1,2,3,4,11,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C212.1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | 3 | 3 |
| C212.2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 1 | 3 | 3 | 3 |
| C212.3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | 3 | 3 |
| C212.4 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 3 | 3 | 3 | 3 |
| C212.5 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | 3 | 3 |
| C212.6 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | 3 | 3 |
| C212 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | 3 | 3 |

## C313- EC6602 ANTENNA AND WAVE PROPAGATION

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C213.1 | Explain the various types of antennas and wave propagation | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C213.2 | Write about the radiation from a current element | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C213.3 | .Analyze the antenna arrays | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C213.4 | Analyze the aperture antennas | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C213.5 | Analyze the Special antennas such as frequency independent and broad band Antennas. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C213.6 | Explain the different type of Propagation of radio waves. | 1,2,3,4,5,6,11,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C213.1 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 1 | 1 | 3 | 3 |
| C213.2 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | 1 | 1 | 2 | 2 |
| C213.3 | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | 1 | 1 | 1 | 2 |
| C213.4 | 3 | 3 | 2 | 2 | 3 | 1 | - | - | - | - | 1 | 1 | 2 | 2 |
| C213.5 | 3 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C213.6 | 3 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 1 | 2 | 2 |
| C213 | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | 1 | 1 | 2 | 2 |

## C314- EC6001 MEDICAL ELECTRONICS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C314.1 | Discuss the application of electronics in diagnostic and therapeutic area. | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C314.2 | Measure biochemical and various physiological information | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C314.3 | Describe the working of units which will help to restore normal functioning. | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C314.4 | Explain the physiology of nerve and muscle tissue stimulation | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C314.5 | Apply the principle techniques used for therapeutic ultrasound, interferential therapy and shortwave therapeutic diathermy | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C314.6 | Apply the engineering and functional operation medical therapeutic equipment | 1,2,3,4,5,6,7,12 | 1,2,3 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C314.1 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314.2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314.3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314.4 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314.5 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314.6 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C314 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

## C315- EC6611 COMPUTER NETWORKS LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C315.1 | Communicate between two desktop computers | 1,2,6,7,12 | 1,2,3 |
| C315.2 | Implement the different protocols | 1,2,6,7,12 | 1,2,3 |
| C315.3 | Program using sockets | 1,2,3,6,7,12 | 1,2,3 |
| C315.4 | Explain the different types of topology | 1,2,3,4,6,7,12 | 1,2,3 |
| C315.5 | Implement and compare the various routing algorithms | 1,2,6,7,12 | 1,2,3 |
| C315.6 | Use simulation tool. | 1,2,6,7,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C315.1 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315.2 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315.3 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315.4 | 3 | 2 | 1 | -- | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315.5 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315.6 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |
| C315 | 3 | 2 | 1 | - | - | 2 | 2 | - | - | - | - | 2 | 1 | 1 | 1 |

## C316- EC6612 VLSI DESIGN LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C316.1 | Write HDL code for basic as well as advanced digital integrated circuit | 1,2,5,11,12 | 1,2,3 |
| C316.2 | Import the logic modules into FPGA Boards | 1,2,3,4,5,11,12 | 1,2,3 |
| C316.3 | Synthesize Place and Route the digital Ips | 1,2,3,4,5,11,12 | 1,2,3 |
| C316.4 | Design, Simulate and Extract the layouts of Digital IC Blocks using EDAtools | 1,2,3,4,5,11,12 | 1,2,3 |
| C316.5 | Design, Simulate and Extract the layouts of A8nalog IC Blocks using EDAtools | 1,2,3,4,5,11,12 | 1,2,3 |
| C316.6 | Test and Verification of IC design | 1,2,3,4,5,11,12 | 1,2,3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
[illegible] College of Engineering

## Mapping of COs,PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C316.1 | 3 | 3 | - | - | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| C316.2 | 3 | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 1 | 2 |
| C316.3 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| C316.4 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| C316.5 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| C316.6 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| C316 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |

## C317- GE6674 COMMUNICATION AND SOFT SKILLS- LABORATORY BASED

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C317.1 | Take international examination such as IELTS and TOEFL | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C317.2 | Make presentations and Participate in Group Discussions | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C317.3 | Successfully answer questions in interviews. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C317.4 | Develop their communicative competence in English with specific reference to speaking and listening | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C317.5 | Enhance their ability to communicate effectively in interviews | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C317.6 | Strengthen their prospects of success in competitive examinations | 1,2,3,4,5,6,11,12 | 1,2,3 |

## Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C317.1 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| C317.2 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| C317. | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | | | | | | | | | | | | | | | |
| C317.4 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| C317.1 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| C317.2 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| C317 | 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 |

## C401- EC6701 RF AND MICROWAVE ENGINEERING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C401.1 | Explain the active & passive microwave devices & components used in Microwave communication systems. | 1,2,3,4,5,6,12 | 1,2,3 |
| C401.2 | Analyze the RF Matching network. | 1,2,3,4,5,6,12 | 1,2,3 |
| C401.3 | Analyze the multi- port RF networks and RF transistor amplifiers. | 1,2,3,4,5,6,12 | 1,2,3 |
| C401.4 | Generate Microwave signals . | 1,2,3,4,5,6,12 | 1,2,3 |
| C401.5 | Measure and analyze Microwave signal and parameters. | 1,2,3,4,5,6,12 | 1,2,3 |
| C401.6 | Design microwave amplifiers. | 1,2,3,4,5,6,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C401.1 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| C401.2 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| C401.3 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| C401.4 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| C401.5 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| C401.6 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
[illegible] Valley, Madurai Main Road
[illegible]-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C401 | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - | - | - | 1 | 3 | 1 | 1 |

## C402- EC6702 OPTICAL COMMUNICATION AND NETWORKS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C402.1 | Realize Basic Elements In Optical Fibers, Different Modes And Configurations. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C402.2 | Analyze The Transmission Characteristics Associated With Dispersion And PolarizationTechniques. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C402.3 | Design Optical Sources And Detectors With Their Use In Optical Communication System. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C402.4 | Analyze the different types of noise in optical Receiver. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C402.5 | Construct Fiber Optic Receiver Systems, Measurements And Techniques. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| C402.6 | Design Optical Communication Systems And Its Networks. | 1,2,3,4,5,6,11,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C402.1 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 3 | 2 | 3 | 2 |
| C402.2 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 3 | 2 |
| C402.3 | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C402.4 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C402.5 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C402.6 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C402 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |

## C403 - EC6703 EMBEDDED AND REAL TIME SYSTEMS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C403.1 | Describe the architecture and programming of ARM processor | 1,2,3,4,5 | 1,2,3 |

| | | | |
|---|---|---|---|
| C403.2 | Outline the concepts of embedded systems | 1,2,3,4,5 | 1,2,3 |
| C403.3 | Explain the basic concepts of real time Operating system design | 1,2,3,4,5 | 1,2,3 |
| C403.4 | Use the system design techniques to develop software for embedded systems | 1,2,3,4,5 | 1,2,3 |
| C403.5 | Differentiate between the general purpose operating system and the real time operating System | 1,2,3,4,5 | 1,2,3 |
| C403.6 | Model real-time applications using embedded-system concepts | 1,2,3,4,5 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C403.1 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C403.2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C403.3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| C403.4 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| C403.5 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C403.6 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| **C403** | **3** | **3** | **3** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **2** | **1** |

## C404 - IT6005 DIGITAL IMAGE PROCESSING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C404.1 | Discuss digital image fundamentals | 1,2,3,4,5,6,12 | 1,2,3 |
| C404.2 | Apply image enhancement and restoration techniques | 1,2,3,4,5,6,12 | 1,2,3 |
| C404.3 | Use image compression and segmentation Techniques | 1,2,3,4,5,6,12 | 1,2,3 |
| C404.4 | Represent features of images | 1,2,3,4,5,6,12 | 1,2,3 |
| C404.5 | Learn the basics of compression and recognition methodsfor color models. | 1,2,3,4,5,6,12 | 1,2,3 |
| C404.6 | Comprehend image compression concepts. | 1,2,3,4,5,6,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C404.1 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C404.2 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C404.3 | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C404.4 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C404.5 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| C404.6 | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **C404** | **3** | **3** | **3** | **3** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **2** | **1** |

## C405 - EC6009 ADVANCED COMPUTER ARCHITECTURE

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C405.1 | To Evaluate performance of different architectures with respect to various parameters | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C405.2 | Analyze performance of different ILP techniques | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C405.3 | Identify cache and memory related issues in multi-processors• | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C405.4 | Explain the function of Different types of memory. | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C405.5 | Analyze the input and output performance measure. | 1,2,3,4,5,6,7,12 | 1,2,3 |
| C405.6 | Compare the Data level parallelism and Thread level parallelism | 1,2,3,4,5,6,7,12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C405.1 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C405.2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C405.3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C405.4 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C405.5 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| C405.6 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | - | - | 2 | 3 | 3 | 2 |
| **C405** | **3** | **3** | **3** | **3** | **2** | **3** | **2** | **-** | **-** | **-** | **-** | **2** | **3** | **3** | **2** |

## C406- EC6014 COGNITIVE RADIO

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **C406.1** | Describe the basics of the software defined radios | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C406.2** | Design the wireless networks based on the cognitive radios | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C406.3** | Explain the concepts behind the wireless networks and next generation networks. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C406.4** | Explain the Architecture of the Cognitive Defined Radio. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C406.5** | Describe the functions, components and design rules of Cognitive Radio. | 1,2,3,4,5,6,11,12 | 1,2,3 |
| **C406.6** | Describe the XG Architecture. | 1,2,3,4,5,6,11,12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C406.1** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 3 | 2 | 3 | 2 |
| **C406.2** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 3 | 2 |
| **C406.3** | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **C406.4** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **C406.5** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **C406.6** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |
| **C406.1** | 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 2 | 2 | 2 | 1 |

**C407- EC6711 EMBEDDED LABORATORY**

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| **C407.1** | Write programs in ARM for a specific Application | 1,2,3,4,5 | 1,2,3 |
| **C407.2** | Interface memory and Write programs related to memory operations | 1,2,3,4,5 | 1,2,3 |
| **C407.3** | Interface A/D and D/A convertors with ARM system | 1,2,3,4,5 | 1,2,3 |
| **C407.4** | Analyse the performance of interrupt. | 1,2,3,4,5 | 1,2,3 |
| **C407.5** | Write programmes for interfacing keyboard, display, motor and sensor | 1,2,3,4,5 | 1,2,3 |
| **C407.6** | Formulate a mini project using embedded system | 1,2,3,4,5 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C407.1 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C407.2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C407.3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| C407.4 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |
| C407.5 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C407.6 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C407 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |

## C408- EC6712 OPTICAL AND MICROWAVE LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C408.1 | Analyze the performance of simple optical link. | 1,2,3,4,5 | 1,2,3 |
| C408.2 | Test microwave components. | 1,2,3,4,5 | 1,2,3 |
| C408.3 | Analyse the mode characteristics of Micro wave Signal. | 1,2,3,4,5 | 1,2,3 |
| C408.4 | Test optical components LED, Photo diode. | 1,2,3,4,5 | 1,2,3 |
| C408.5 | Analyse the mode characteristics of fiber. | 1,2,3,4,5 | 1,2,3 |
| C408.6 | Analyse the radiation of pattern of antenna. | 1,2,3,4,5 | 1,2,3 |

### Mapping of COs,PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C408.1 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C408.2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C408.3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| C408. | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | | | | | | | | | |
| C408.5 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C408.6 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| C408 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 1 |

## C409- EC6801 WIRELESS COMMUNICATION

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C409.1 | Characterize wireless channels | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C409.2 | Design and implement various signaling schemes for fading channels | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C409.3 | Design a cellular system | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C409.4 | Compare multipath mitigation techniques and analyze their performance | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C409.5 | Design and implement systems with transmit/receive diversity | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C409.6 | Design and implement the MIMO systems and analyze their performancerning models | 1.2.3.4.5.6.7.12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C409.1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409.2 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409.3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409.4 | 1 | 2 | 3 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409.5 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409.6 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C409 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

## C410- EC6802 WIRELESS NETWORKS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C410.1 | Conversant with the latest 3G/4G and WiMAX networks and its architecture. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C410.2 | Design and implement wireless network environment for any application using latest wireless protocols and standards. | 1.2.3.4.5.6.7.12 | 1,2,3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | |
|---|---|---|---|
| C410.3 | Implement different type of applications for smart phones and mobile devices with latest network strategies. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C410.4 | Explain the Wireless wide area network | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C410.5 | Explain the LTE network architecture and protocol. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C410.6 | Describe the OFDM-MIMO systems, Cognitive Radio. | 1.2.3.4.5.6.7.12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C410.1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410.2 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410.3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410.4 | 1 | 2 | 3 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410.5 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410.6 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C410 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

## C411 - GE6075 PROFESSIONAL ETHICS IN ENGINEERING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C411.1 | apply ethics in society. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C411.2 | discuss the ethical issues related to engineering. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C411.3 | Realize the responsibilities and rights in the society. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C411.4 | create an awareness on Engineering Ethics and Human Values. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C411.5 | Instill Moral and Social Values and Loyalty | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C411.6 | Appreciate the rights of others. | 1.2.3.4.5.6.7.12 | 1,2,3 |

**Mapping of COs, PSOs with POs**

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C411.1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C411.2 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C411.3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C411. | 1 | 2 | 3 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | | | | | | | | | | | |
| C411.5 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C411.6 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C411 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

## C412- GE6757 TOTAL QUALITY MANAGEMENT

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C412.1 | Apply the tools and techniques of quality management to manufacturing and services processes. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C412.2 | Facilitate the Quality Management principles and process. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C412.3 | Apply TQM concepts in a selected enterprise. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C412.4 | Apply TQM principles in a selected enterprise | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C412.5 | Ability to understand Six Sigma and apply Traditional tools, New tools, Benchmarking andFMEA. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C412.6 | Ability to understand Taguchi's Quality Loss Function, Performance Measures and apply QFD, TPM, COQ and BPR. | 1.2.3.4.5.6.7.12 | 1,2,3 |

### Mapping of COs, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C412.1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412.2 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412.3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412.4 | 1 | 2 | 3 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412.5 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412.6 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C412 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

## C413- EC6811 PROJECT WORK

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C413.1 | will be in a position to take up any challenging practical problems and find solution by formulating proper methodology. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C413.2 | Find solution by formulating proper methodology. | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C413.3 | solve a specific problem right from its identification | 1.2.3.4.5.6.7.12 | 1,2,3 |

| | | | |
|---|---|---|---|
| C413.4 | Analyze the literature review till the successful solution of the same | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C413.5 | preparing project reports . | 1.2.3.4.5.6.7.12 | 1,2,3 |
| C413.6 | Face reviews and viva voce examination. | 1.2.3.4.5.6.7.12 | 1,2,3 |

## Mapping of COs, PSOs with POs

| Course | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C413.1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413.2 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413.3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413.4 | 1 | 2 | 3 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413.5 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413.6 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |
| C413 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | - | - | - | - | 1 | 3 | 3 | 3 |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.