# Detailed syllabus for

# B.Tech in Electronics and Communication Engineering

# (Seventh Semester)

# 2021

**SEVENTH SEMESTER**

| Sl. No. | Course Category | Subject Code | Subject Title | L | T | P | Contact Hours/ week | Credit | Full Marks |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Program Elective-20 (Any One) | PE EC 701 | 4)Wireless and Mobile Communication<br>5) Image Processing<br>6)Computer Networking | 3 | 0 | 0 | 3 | 3 | 100 |
| 2. | Program Elective-3 (Any One) | PE EC 702 | 4)Information Theory and Coding<br>5)Audio Video Engineering<br>6)Artificial Neural Network | 2 | 0 | 0 | 2 | 2 | 100 |
| 3. | Open Elective-1 | OE EC 703 | **Refer to Annexure-I** | 3 | 0 | 0 | 3 | 3 | 100 |
| 4. | Open Elective-2 | OE EC 704 | **Refer to Annexure-II** | 2 | 0 | 0 | 2 | 2 | 100 |
| 5. | Project - 2 | PR EC 705 | Project Work Intermediate | 0 | 0 | 12 | 12 | 6 | 200 |
| 6. | Summer Internship-2 | SI EC-706 | Internship - II | 0 | 0 | 0 | 0 | 1 | 100 |
| 7. | Seminar - 1 | SE EC 707 | Seminar on Contemporary Engineering Topics - I | 0 | 0 | 2 | 2 | 1 | 100 |
| | | | Total : | **10** | **0** | **14** | **24** | **18** | **800** |

## Program Elective-2.1: Wireless and Mobile Communication(PEEC-701/1)

| | |
|---|---|
| Course Code | PEEC-701/1 |
| Course Title | Wireless and Mobile Communication |
| Number of Credits | 3 (L: 3, T: 0, P: 0) |
| Prerequisites | Analog and Digital Communication, Electromagnetic Theory, Antenna and Wave Propagation. |
| Course Category | Program Elective-2 (PE) |

| | |
|---|---|
| Number of classes | 38 hours |

**Course Outcome:**

On the completion of this course, the students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Apply their understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards. | K3 |
| CO-2 | Compare different technologies for wireless communication systems. | K2 |
| CO-3 | Apply their understanding on multiple access techniques, digital modulation methods, multicarrier modulation ,OFDM for Wireless Communication | K3 |
| CO-4 | Apply their understanding on cellular concepts and cellular system design fundamentals. | K3 |
| CO-5 | Compare different generations of Cellular System | K2 |

**Course Content:**

**Module 1: Overview of Wireless Communication (08 Hours)**

Introduction to Wireless Communication: unique constraints and challenges, advantage and applications of Wireless Communication, wireless local loop (WLL), cellular concept.
Recent wireless technologies: multicarrier modulation, OFDM, MIMO system, diversity-multiplexing tradeoff in wireless communication.

**Module 2: Multiple Access Techniques and Overview of trending Wireless Networks (10 Hours)**

Multiple Access Techniques:Contention-free multiple access schemes (FDMA, TDMA, CDMA, SDMA and hybrid), Contention-based multiple access schemes (CSMA, ALOHA), CSMA/CA vs CSMA/CD.
Recent Trends: Wireless Personal Networks (Bluetooth, ZigBee), Software Defined Radio, Wireless Local Area Networks (IEEE 802.11, architecture, medium access methods, WLAN standards), Wireless Metropolitan Area Network (WiMax), Introduction to Wireless Ad-hoc Network, security issues and challenges in Wireless Network.

**Module 3: Cellular concepts: (10 Hours)**

System design fundamentals: Cellular system, hexagonal geometry cell, frequency reuse, improving capacity and coverage of cell, cell splitting, cell sectorization, channel assignment, hand-off, interference, distance to frequency reuse ratio, co-channel interference reduction factor,S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, co-channel measurement design of antenna system, antenna parameter and their effects.
Introduction to Digital Modulation techniques: BPSK, QPSK and variants, QAM, MSK and GMSK.

**Module 4: Overview of generations of Cellular Systems: (10 Hours)**

Overview of 2G standards: GSM architecture, ISM-136 (D-AMPS), ISM-95, GPRS, EDGE (2.75G)

3G cellular standards: UMTS, CDMA2000
Introduction to LTE, Introduction to 5G.

***REFERENCES / SUGGESTED LEARNING RESOURCES***:

***TEXT BOOKS***:


1. "Wireless Communications", Andrea Goldsmith, Cambridge University Press, 2005.
2. "Wireless Communication the Fundamental and Advanced Concepts" ,Sanjay Kumar, River Publishers, Denmark, 2015 (Indian reprint).
3. "Mobile Communications Engineering", William C. Y. Lee, Mc Graw Hill Publications.
4. "Mobile and personal Communication system and services", Rajpandya, IEEE press (PHI).
5. "From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Martin Sauter, Third Edition.


***REFERENCE BOOKS***


1. "Wireless Communications and Networks", Vijay K Garg, Morgan Kaufmann Publishers an Imprint of Elsevier, USA 2009 (Indian reprint)
2. "Mobile Communication", J. Schiller, 2/e, Pearson Education, 2012.
3. Adhoc Mobile Wireless network, C.K.Toh ,Pearson.
4. Mobile Communication Handbooks, IEEE Press.
5. "Fundamentals of LTE ",Arunabha Ghosh, First Edition,Pearson.


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## Program Elective-2.2: Image Processing (PEEC-701/2)

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|---|---|
| CourseCode | PE EC 701/2 |
| Course Title | Image Processing |
| Number of credits | 3(L: 3, T: 0, P: 0) |
| Prerequisites | Basic Knowledge of Mathematics and Signals |
| Course Category | Program Elective |
| Number of classes | 36 hours |

**CourseOutcome:** At the end of the course, the students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Construct Mathematical representation of images and analyze different relationships and operations on them. | K3 |
| CO-2 | Apply different techniques employed for the enhancement of images | K3 |
| CO-3 | Analyze various colour image models and restoration approaches. | K4 |
| CO-4 | Develop algorithms for image compression and coding. | K6 |

**Course Content**

**Module1: Digital Image Fundamentals (08 hours)**

Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, imagesampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures. Simple Operations- Arithmetic, Logical, Geometric Operations. Mathematical Preliminaries - 2D Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

**Module2: Image Transforms and Enhancement(10 hours)**

Image Transforms: 2D Orthogonal and Unitary Transforms-Properties and Examples. 2D DFT- FFT – DCT - Hadamard Transform - Haar Transform - Slant Transform - KL Transform -Properties And Examples. Image Enhancement:- Histogram Equalization Technique- Point Processing-Spatial Filtering-In Space And Frequency - Nonlinear Filtering-Use Of Different Masks.

**Module3: Color Models and Image Restoration (08hours)**

Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.
Image Observation And Degradation Model, Circulant And Block Circulant Matrices and Its Application In Degradation Model - Algebraic Approach to Restoration- Inverse By Wiener Filtering - Generalized Inverse-SVD and Interactive Methods - Blind De-convolution-Image Reconstruction From Projections.

**Module4: Image compression and Segmentation (10hours)**

Redundancy and Compression Models -Loss Less AndLossy. Loss Less- Variable-Length, Huffman, Arithmetic Coding - Bit-Plane Coding, Loss Less Predictive Coding, Lossy Transform (DCT) Based Coding, JPEG Standard - Sub Band Coding, Image Segmentation: Edge Detection - Line Detection - Curve Detection - Edge Linking And Boundary Extraction, Boundary Representation, Region Representation and Segmentation, Morphology-Dilation, Erosion, Opening and Closing. Hit And Miss Algorithms Feature Analysis.

***REFERENCES/SUGGESTED LEARNING RESOURCES*:**


1) Digital Image Processing R.C. Gonzalez and R.E. Woods, , Second Edition, Pearson Education 3rd edition 2008
2) Fundamentals of Digital Image Processing Anil Kumar Jain, , Prentice Hall of India.2nd edition 2004
3) Digital Image Processing, Kenneth R Castleman, Pearson Education,1995.
4) Digital Image Procesing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education ,2009. Pvt Ltd, NewDelhi
5) A Practical Approach for Image Processing & Computer Vision In MATLAB,Prof. NeerajBhargava, Dr. RituBhargava, AbhishekPandey, CreateSpace Independent Publishing Platform (December 26, 2016)

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# Program Elective-2.3: Computer Networking (PEEC-701/3)

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|---|---|
| Course Code | PE EC 701/3 |
| Course Title | Computer Networking |
| Number of Credits | 03 (L:3,T:0,P:0) |
| Prerequisites | Operating System and Computer Architecture |
| Course Category | Program Elective |
| Number of classes | 38 hours |

**Course Outcome:**

After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Interpret the different building blocks of communication network and its architecture. | K2 |
| CO-2 | Analyze error and flow control mechanisms in data link layer. | K4 |
| CO-3 | Apply sub-netting and analyze the performance of network layer | K3 |
| CO-4 | Construct and examine various routing protocols | K3 |
| CO-5 | Illustrate the suitable Application layer protocols for specific applications and its respectivesecurity mechanisms | K2 |

**Course Content:**

**Module 1: Networking Principles and layered architecture (9 hours)**

Data Communications and Networking: A Communications Model – Data Communications - Evolution of network, Requirements, Applications, Network Topology (Line configuration, DataFlow), Protocols and Standards, NetworkModels (OSI, TCP/IP)

Switched Communications Networks – Circuit Switching – Packet Switching – Comparison ofCircuit Switching and Packet Switching – Implementing Network Software, NetworkingParameters(Transmission Impairment, Data Rate and Performance)

**Module 2: Data link layer (10 hours)**

Error Detection and Correction – Hamming Code , CRC, Checksum- Flow control mechanism – Sliding Window Protocol - GoBack - N - Selective Repeat - Multiple access Aloha - Slotted Aloha- CSMA, CSMA/CD – Multiple Access Networks (IEEE 802.3), Token Ring(IEEE 802.5) andWireless Networks (IEEE 802.11, 802.15).

**Module 3: Network layer (10 hours)**

IPV4 Address Space – Notations – Classful Addressing – Classless Addressing – Network AddressTranslation – IPv6 Address Structure – IPv4 and IPv6 header format.

Routing-Link State and Distance Vector Routing Protocols- Implementation-PerformanceAnalysis- Packet Tracer.

**Module 4: Transport layer & Application layer (9 hours)**

TCP and UDP-Congestion Control-Effects of Congestion-Traffic Management-TCP Congestion Control-Congestion Avoidance Mechanisms-Queuing Mechanisms-QoS Parameters
Application layer-Domain Name System-Case Study : FTP-HTTP-SMTP-SNMP.
Recent Trends in Computer Networks.

***REFERENCES / SUGGESTED LEARNING RESOURCES*:**


1. Computer Networks, Tanenbaum, Pearson.
2. Routing TCP/IP, Volume 1, Jeff Doyle , Jennifer DeHaven Carroll, Cisco Press; 2nd edition .
3. Data Communications and Networking, Behrouz A. Forouzan, McGraw Hill Education.
4. Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications, Douglas Comer, David Stevens, Pearson,
5. UNIX Network Programming, W. Richard Stevens, Prentice Hall.


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## Program Elective-3.1:Information Theory and Coding(PEEC 702/1)

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|---|---|
| Course Code | PE EC 702/1 |
| Course Title | Information Theory and Coding |
| Number of Credits | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | Digital Communication |
| Course Category | Program Elective |
| Number of classes | 26 hours |

**Course Outcome:** After completing the course, the students will be able to-

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Demonstrate the concept of Information and Entropy with their properties | K2 |
| CO-2 | Construct Shannon Fano Code, Huffman Code, Limpel Ziv Code. | K3 |
| CO-3 | Explain Galois algebra and their relationship in channel coding. | K2 |
| CO-4 | Apply linear block codes in random error correction. | K3 |
| CO-5 | Construct convolutional code to reduce bit error rate in the communication channel | K3 |

**Module- 1:Information theory (07 Hours)**

Information and entropy - properties of entropy of a binary memoryless source - extension of a binary memoryless source - source coding theorem - Shannon fano coding - Huffman coding - Lempel ziv coding - discrete memoryless source - binary symmetric channel - mutual information - properties - channel capacity - channel coding theorem.

**Module 2:Introduction to algebra (06 Hours)**

Groups - fields - binary field arithmetic - construction of Galois field - basic properties - computations - vector spaces – matrices.

**Module 3:Coding I (07 Hours)**

Linear block codes - generator matrices - parity check matrices - encoder - syndrome and error correction - minimum distance - error correction and error detection capabilities – cyclic coding and decoding.

**Module 4:Coding II (06 Hours)**

Convolutional codes - encoder - generator matrix - transform domain representation - state diagram - distance properties - maximum likelihood decoding - viterbi decoding –Introduction to Turbo coding and LDPC.

***BOOKS***:


1. Simon Haykins, Communication Systems, John Wiley
2. Shu Lin, Costello D.J., Error Control Coding - Fundamentals and Applications, Prentice Hall Inc. Englewood Cliffs
3. Sklar, Digital Communication, Pearson Education
4. Ranjan Bose, Information Theory Coding And Cryptography, McGraw-Hill
5. J S Chitode, Information Theory and Coding, Technical Publication, Pune


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## Program Elective-3.2: Audio &Video Engineering(PEEC 702/2)

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|---|---|
| Course Code | PEEC 702/2 |
| Course Title | Audio and Video Engineering |
| Number of Credits | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | Basics of signal processing, antennas |
| Course Category | Communication Engineering (CE) |
| Number of classes | 24 hours |

**Course Outcome:** After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Explainworking of Audio system. | K2 |
| CO-2 | Explain various TV fundamentals. | K2 |
| CO-3 | Demonstrate theworking of Monochrome TV Receivers. | K2 |
| CO-4 | Outlinethefundamental working principle of Colour TV Receivers. | K2 |

**Module-I: Audio systems (6Hours)**

Microphones, loudspeakers, recording & reproduction of sound; high fidelity stereophonic systems.

**Module-II: TV fundamentals (6Hours)**

Scanning, synchronization & blanking, composite video, Aspect Ratio, picturetubes,phosphor screen, persistence of vision, roll of aluminized coating and shadow mask.

**Module-III: Monochrome TV Receivers (6Hours)**

Block diagram of TV transmitter & receiver, RF tuner, AGC, Video Detector, Sound Channel Separation, Sync Separation Circuits, Vertical and Horizontal Deflection Circuits, E.H.T.

**Module-IV: Colour Television(6Hours)**

PAL colour system. Cable and satellite TV,HDTV,3DTV, DTH. Video displays: LCD, LED and PLASMA screens.

***CASE STUDIES***:

1. Ramya, G., & Kulkarni, S. (2020). Visual saliency based video summarization: A case study for preview video generation. In *Information, Photonics and Communication* (pp. 155-165). Springer, Singapore.
2. Zyka, K. (2019). The Digital Audio Broadcasting Journey from the Lab to Listeners-the Czech Republic Case Study. *Radioengineering*, *29*(2).
3. Lessel, P., Vielhauer, A., & Krüger, A. (2017, May). Expanding video game live-streams with enhanced communication channels: a case study. In *Proceedings of the 2017 CHI conference on human factors in computing systems* (pp. 1571-1576).
4. Lee, J. Y., & Kim, S. K. (2018, April). Development for Audio-Visual Archiving System of The National Archives of Korea: A Case Study. In *Archiving Conference* (Vol. 2018, No. 1, pp. 133-138). Society for Imaging Science and Technology.
5. Jokisch, O., Strutz, T., Leipnitz, A., Siegert, I., & Ronzhin, A. AUDIO AND VIDEO PROCESSING OF UAV-BASED SIGNALS IN THE HARMONIC PROJECT.

***TEXTBOOKS*:**

1. R G Gupta, Television Engineering and Video Systems, Tata McGraw-Hill Education.
2. R G Gupta, *Audio* & Video Systems, Tata McGraw-Hill Education
3. A.M.Dhake, "Television and Video Engineering", McGraw Hill Publications.
4. R.R.Gulati,"MonochromeandColourTV",NewAgeInternationalPublication.

***REFERENCEBOOKS*:**

1. S.P.Bali, Colour Television Theory and Practice, TMH.
2. R.R.Gulati,"ModernTelevisionPractice–Principles,TechnologyandService",NewAgeInternational Publication.
3. B.GrobandC.E.Herndon,"BasicTelevisionandVideoSystems",McGrawHill

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## Program Elective-3.3:Artificiel Neural Networks (PEEC 702/3)

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|---|---|
| Course Code | PEEC 702/3 |
| Course Title | Artificial Neural Networks |
| Number of Credits | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | Logical and analytical skills, basic electronics. |
| Course Category | Program Elective-3 |
| Number of classes | 24 hours |

**Course Outcome:-**

After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Explain the biological neural network. | K2 |
| CO-2 | Model equivalent neuron models. | K3 |
| CO-3 | Extend the knowledge of learning strategies and learning rules | K2 |
| CO-4 | Illustrate the architecture, learning algorithm and issues of various feed forward and feedback neural networks | K2 |

**Course Content:-**

**Module- 1:Introduction to Neural Networks(06)**

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

**Module- 2: Introduction to Learning Process (06)**

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

**Module- 3: Single Layer & Multi-layer Feed forward Neural Networks(06)**

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

**Module- 4:Back Propagation (06)**

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning.

***REFERENCES / SUGGESTED LEARNING RESOURCES*:-**


1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Inteligance, Li Min Fu MC GRAW HILLEDUCATION 2003
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House,Ed. 2006
5. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.
6. Rajasekharan and Rai, “Neural Networks, Fuzzy logic, Genetic algorithms:synthesis and applications”, PHI Publication.
7. S.N.Sivanandam, S.Sumathi, S.N.Deepa, “Introduction to Neural Networks using MATLAB 6.0 “TMH, 2006

8. J.M.Zurada, “Artificial Neural Networks”.
9. Timothy.J.Ross, “Fuzzy logic Applications”.
10. James A Freeman and Davis Skapura, “Neural Networks”, Pearson Education, 2002.
11. Simon Hakins, “Neural Networks”, Pearson Education
12. C.Eliasmith and CH.Anderson, “Neural Engineering”, PHI Bart Kosko, “Neural Networks & Fuzzy systems”.

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**3. Open Elective-1:** Refer to Annexure-I

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**4. Open Elective-2:** Refer to Annexure-II

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## 5. Project Work Intermediate (PR EC 705)

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|---|---|
| Course Code | PR EC 705 |
| Course Title | Project Work Intermediate |
| Number of Credits | 6 (L: 0, T: 0, P: 12) |
| Prerequisites | Nil |
| Course Category | Project (PR) |
| Number of classes | 130 hours |

**Course Outcome:-**

After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Demonstrate a sound technical knowledge of their selected project topic | K2 |
| CO-2 | Develop the skill of working in a Team | K3 |
| CO-3 | Design engineering solutions to complex problems utilizing a systematic approach | K6 |
| CO-4 | Design the solution of an engineering project involving latest tools and techniques | K6 |
| CO-5 | Develop the skill of effective communication with engineers and the community at large in written an oral forms | K3 |
| CO-6 | Demonstrate the knowledge, skills and attitudes of a professional engineer | K2 |

**Course Content:-**

The project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The course should have the following-

1) Develop sound knowledge about the domain of the project work.
2) Perform detailed study about various components of a project.
3) Learn to be an important member of a team for successful execution of a project work.
4) Study about methodologies and professional way of documentation and communication related to project work.
5) Develop idea about problem formulation, finding the solution of a complex engineering problem.
6) Develop project report as per the suggested format to communicate the findings of the project work.
7) Acquire the skill of effective oral communication to the fellow engineers and people in the society at large.
8) Develop knowledge of how to organize, scope, plan, do and act within a project thesis.
9) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
10) Demonstrate the implementation of a project work.

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## 6. Industry Internship – II(SIEC 706)

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|---|---|
| Course Code | SIEC 706 |
| Course Title | Industry Internship – II |
| Number of Credits | 1 (L: 0, T: 0, P: 0) |
| Prerequisites | Nil |
| Course Category | Summer Internship (SI) |
| Number of classes | - |

**Course Outcome:-**

After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course of study | K3 |
| CO-2 | Develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organizational setting | K3 |
| CO-3 | Demonstrate the skill to communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means | K2 |
| CO-4 | Show professional ethics by displaying positive disposition during internship | K2 |

| | | |
|---|---|---|
| CO-5 | Decide career options by considering opportunities in company, sector, industry, professional and educational advancement | K5 |

**Course Content:-**

The industry internship aims to provide the student with:

1. A practice-oriented and 'hands-on' working experience in the real world or industry, and to enhance the student's learning experience.
2. An opportunity to develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organisational setting.
3. An opportunity to further develop and enhance operational, customer service and other life-long knowledge and skills in a real world work environment.
4. Pre-employment training opportunities and an opportunity for the company or organisation to assess the performance of the student and to offer the student an employment opportunity after his/her graduation, if it deems fit.

Each student shall

1) Identify an internship program of relevance in his/her branch of engineering to undergo during summer break between $6^{th}$ and $7^{th}$ semester,
2) Get approval of the concerned HOD,
3) Undergo the industry internship program for minimum 4 weeks duration
4) Prepare their own report
5) Present in the class among fellow students and faculty members / deliver viva voce.
6) Submit the report and participation/course completion certificate.

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## 7. Seminar on Contemporary Engineering Topics – I(SE EC 707)

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|---|---|
| Course Code | SE EC 707 |
| Course Title | Seminar on Contemporary Engineering Topics – I |
| Number of Credits | 1 (L: 0, T: 0, P: 2) |
| Prerequisites | Nil |
| Course Category | Seminar (SE) |
| Number of classes | 24 hours |

**Course Outcome:-**

After completion of the course, students will be able to:

| CO Number | CO Description | K-level |
|---|---|---|
| CO-1 | Identify contemporary topics in respective branch of engineering | K3 |
| CO-2 | Survey literature to understand insight of the selected topic | K4 |
| CO-3 | Develop report writing and presentation making skill | K3 |
| CO-4 | Utilize suitable aid to present the topic among audience. | K3 |

**Course Content:-**

Each student shall

1. Identify a topic of current relevance in his/her branch of engineering,
2. Get approval of the faculty concerned/HOD,
3. Collect sufficient literature on the selected topic, study it thoroughly (literature survey),
4. Prepare their own report and presentation slides and
5. Present in the class among fellow students and faculty members.

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# Tripura University
## (A Central University)