



**B. Tech. (ECE) VIII Semester**

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture Hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1.	PE-VI	Professional Elective-VI	4	0	0	4	30	70	4
2.	OE-III	Open Elective-III	2	0	0	2	30	70	2
3.	PW4209EC	Project Stage-II	0	0	12	12	50	100	6
4.	MC-42aHS/42bHS	NSS/Yoga	2	0	0	2	30	0	0
Total			8	0	12	20	140	240	12

L     Lecture  
T     Tutorial  
P     Practical  
CIE   Continuous Internal Evaluation  
SEE   Semester End Examination  
PC    Professional core

**Professional Elective-VI**

PEVI4201EC	Wireless Sensor Networks
PEVI4202EC	Signal Processing for AI & ML
PEVI4203EC	System on chip Design
PEVI4204EC	Optimization Techniques

**Open Elective-III**

OEIII4205CS	Information Security
OEIII4206HS	IPR and Patenting
OEIII4208HS	Human Values and Professional Ethics

**Mandatory Course:**

MC42aHS	NSS
MC42bHS	Yoga



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**B. Tech. (ECE) VIII Semester**

**Professional Elective-IV (a)**

**PEIV4201EC: WIRELESS SENSOR NETWORKS**

*Credits: 4*

**Instruction:** 4 hours per week

**CIE:** 30 marks

**Duration of SEE:** 3 hours

**SEE:** 70 marks

**UNIT - I**

**Introduction:** Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.

**UNIT - II**

**Introduction to adhoc/sensor networks:** Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

**UNIT - III**

**MAC Protocols :** Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

**UNIT - IV**

**Routing Protocols:** Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols

**UNIT - V**

**QoS and Energy Management:** Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

***Suggested Readings:***

1. C. Siva Ram Murthy, and B. S. Manoj, "*AdHoc Wireless networks* ", Pearson Education - 2008.
2. Feng Zhao and Leonides Guibas, "*Wireless sensor networks* ", Elsevier publication - 2004.
3. Jochen Schiller, "*Mobile Communications*", Pearson Education, 2nd Edition, 2003.
4. William Stallings, "*Wireless Communications and Networks* ", Pearson Education - 2004
5. Holger Karl and Andreas Willing, "*Protocols and Architectures for Wireless Sensor Networks*", John Wiley and Sons, 2005.



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**B. Tech. (ECE) VIII Semester**

**Professional Elective-IV (b)**

**PEIV4202EC: SIGNAL PROCESSING FOR AI&ML**

*Credits: 4*

**Instruction:** 4 hours per week

**CIE:** 30 marks

**Duration of SEE:** 3 hours

**SEE:** 70 marks

**UNIT - I**

Brief review of vectors and matrices, properties of eigenvalue decomposition and singular value decomposition (SVD), applications of SVD; Brief review of signal processing concepts: Applications of filtering and extraction.

**UNIT - II**

Introduction to Artificial Intelligence, Problem formulation, Problem Definition - Problem characteristics, Problem solving methods, Control strategies, Search strategies, Heuristic searching techniques

**UNIT - III**

Introduction to Machine learning: Definition of learning systems; Designing a learning system, Goals and applications of machine learning; Classification of learning system, supervised learning, unsupervised learning, reinforcement learning.

**UNIT - IV**

Basics of Principal component analysis, support vector machines, linear regression, k-means clustering algorithm, Bayesian learning approach. (Qualitative Treatment only)

**UNIT - V**

Applications of AI & ML in signal processing, wireless communications and image processing; use of IOT and AI in 5G communication systems. (Qualitative Treatment only)

**Suggested readings:**

1. Kevin Night and Elaine Rich, Nair B., "*Artificial Intelligence (SIE)*", Mc Graw Hill- 2008.
2. Dan W. Patterson, "*Introduction to AI and ES*", Pearson Education, 2007.
3. Stuart Russel and Peter Norvig "*AI - A Modern Approach*", 2nd Edition, Pearson Education 2007.
4. Tom M. Mitchell, *Machine Learning*, MGH, Indian Edition, ISBN 1259096955, 2013.
5. Jason Bell, *Machine Learning: Hands-On for Developers and Technical Professionals*, John Wiley & Sons, 1st ed., ISBN-13: 978-1118889060, 2014.



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**Professional Elective-VI (c)  
PEVI4203EC: SYSTEM ON CHIP DESIGN**

*Credits: 4*

**Instruction:** 4 hours per week

**CIE:** 30 marks

**Duration of SEE:** 3 hours

**SEE:** 70 marks

**UNIT - I**

**Introduction to System on Chip:** System Architecture components of the system, hardware and Software, processor architecture, memory and addressing, system level interconnection, an Approach for SOC design, system architecture and complexity.

**UNIT - II**

**Processor design:** Processor architecture and organization, processor design trade-offs, the Reduced instruction set computer, the acron risc machine, architectural inheritance, the arm Programmers model, arm development tools.

**UNIT - III**

**Organization of an SoC:** 3-stage pipeline arm organization, 5-stage pipeline arm organization, the arm coprocessor interface coprocessor instructions, data operations, data transfers, the thumb bit in the cpsr, the thumb programmer's model

**UNIT - IV**

**Architectural support for system development:** The arm memory interface, the advanced micro controller bus architecture (amba), the arm reference peripheral specification, hardware system prototyping tools, the armulator, the jtag boundary scan test architecture embedded trace, signal processing support.

**UNIT - V**

**Memory hierarchy:** Memory size and speed: memory cost, on chip memory, caches: processor & Memory speeds, unified & Harvard caches, cache performance metrics, the direct mapped Cache the set-associative cache, the fully associative cache, write strategies cache design-an example.

**Suggested readings:**

1. Steve furber, "arm system-on-chip architecture", second edition, pearson publications
2. Andrew.n.sloss, domnic symes,chris wright, "arm system developers guide", publications Elsevier.



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**B. Tech. (ECE) VIII Semester**

**Professional Elective-VI (d)**

**PEVI4204EC: OPTIMIZATION TECHNIQUES**

*Credits: 4*

**Instruction:** 4 hours per week

**CIE:** 30 marks

**Duration of SEE:** 3 hours

**SEE:** 70 marks

**Unit-I**

**Introduction:** Statement of an optimization problem, Classification of optimization problems, Overview of various optimization Techniques, Properties of vectors, norms, positive semi-definite matrices.

**Unit-II**

**Classical optimization techniques:** Single variable optimization, Multivariable optimization, Convexity and concavity of functions of one and two variables, convex optimization problems, the simplex optimization technique, Test Functions.

**Unit-III**

**Unconstrained optimization:** General properties of minimization algorithms, Line search, the gradient method, Newton's method, least square Algorithm. Constrained optimization: Active constraints versus inactive constraints, transformations

**Unit-IV**

**Genetic algorithm (GA):** Fundamentals of Genetic algorithm, History, Basic concepts, working principle, Applications of GA.

Swarm intelligence: Basic particle swarm optimization, initialization techniques, Theoretical investigations and parameter selection, Design of PSO algorithm using computational statistics, Application of PSO.

**Unit-V**

Differential Evolution: Classical differential evolution- An outline, Mutation, cross over, selection, Teaching learning based optimization (TLBO), applications of TLBO for standard Bench mark test functions.

**Suggested Readings:**

1. Richard W Daniels, An Introduction to Numerical Methods and Optimization Techniques, Elsevier North Holland Inc,
2. S Rajasekharan, G.A Vijaya Lakshmi Pai, Neural Networks, Fuzzy logic, and Genetic algorithms, Synthesis and Applicationlls, Prentice hall of India, 2007
3. Rao, S.S., "Engineering Optimization: Theory and Practice", John Wiley & Sons, Inc., 2009
4. Taha, H.A., "Operations Research, Pearson Education India", New Delhi, India, 2008.
5. Randy L. Haupt and Sue Ellen Haupt, "Practical genetic algorithms" second edition, a John Wiley & sons, inc., publication -2004.



**B. Tech. (ECE) VIII Semester**

**Open Elective-III (a)  
OEIII4205CS: INFORMATION SECURITY**

*Credits: 2*

**Instruction:** 2 hours per week  
**CIE:** 30 marks

**Duration of SEE:** 3 hours  
**SEE:** 70 marks

**UNIT - I**

**Introduction:** Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, Threats, a model for Network Security.

**UNIT - II**

**Cryptography Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques (mono-alphabetic cipher, poly-alphabetic, one-time pad) encryption and decryption, symmetric and asymmetric key cryptography, key range and key size

**UNIT - III**

**Symmetric key Ciphers:** Block Cipher principles & Algorithms (DES, AES, RC4), Key distribution in symmetric system

**UNIT - IV**

**Asymmetric key Ciphers:** Principles of public key crypto systems, Public key Algorithms: RSA, Diffie-Hellman, ECC, Key Distribution Key in asymmetric system.

**UNIT - V**

**Authentication:** Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure Hash Algorithm-1, Digital signatures, MD5.

**Suggested Readings:**

1. *Cryptography and Network Security* : William Stallings, Pearson Education, 4<sup>th</sup> Edition
2. *Information Security, Principles and Practice*: Mark Stamp, Wiley India.
3. *Cryptography and Network Security*: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1<sup>st</sup> Edition.
4. *Cryptography and Network Security* : Forouzan Mukhopadhyay, MC Graw Hill, 2<sup>nd</sup> Edition.
5. *Cryptography and Network Security* : Atul Kahate, Mc Graw hill Edition.
6. *Introduction to Network Security*: Neal Krawetz, CENGAGE Learning.

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**B. Tech. (ECE) VIII Semester**

**Open Elective-III (b)  
OEIII4206HS: IPR AND PATENTING**

*Credits: 2*

**Instruction:** 2 hours per week

**CIE:** 30 marks

**Duration of SEE:** 3 hours

**SEE:** 70 marks

**UNIT-I**

Introduction to intellectual property Act and Law-the evolutionary past-the IPR tool kit- legal tasks in intellectual property law-ethical obligations in Para legal tasks in intellectual property law

**UNIT-II**

Introduction to trade mark - Trade mark registration process-Post registration procedures-Trade mark maintenance - transfer of rights-inter party's proceeding - Infringement-Dilution ownership of trade mark-likelihood of confusion - trademark claims- trademark litigations

**UNIT-III**

Introduction to copy rights- principles of copyright - subjects matter of copy right- rights afforded by copyright law- copyright ownership transfer and duration - right to prepare derivative works-right of distribution- right to perform the work publicity- copyright formalities and registrations

**UNIT-IV**

Introduction to patent law- Rights and limitations- Rights under patent law- patent requirements-ownership - transfer- patent application process- patent infringement- patent litigation

**UNIT-V**

Introduction to transactional law- creating wealth and managing risk - employment relationship in the Internet and technologic al sector-contact for internet and technological sector

***Suggested Readings:***

1. Kompal Bansal and Praishit Bansal, "*Fundamentals of IPR for Engineers*", 1st Edition, BS Publications, 2012.
2. Prabhuddha Ganguli, "*Intellectual Property Rights*", 1st Edition, TMH, 2012.
3. R Radha Krishnan & S Balasubramanian, "*Intellectual Property Rights*", 1st Edition, Excel Books, 2012.
4. M Ashok Kumar & mohd Iqbal Ali, "*Intellectual Property Rights*", 2nd Edition, Serial publications, 2011.



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**B. Tech. (ECE) VIII Semester**

**Open Elective-III (c)**

**OE-III 4208HS: HUMAN VAUES AND PROFESSIONAL ETHICS**

*Credits: 2*

*Instruction: 2 hours per week*

*CIE: 30 marks*

*Duration of SEE: 3 hours*

*SEE: 70 marks*

**UNIT - I**

Human Values: Morals, values & ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, valuing time, co- operation, commitment, empathy, self-confidence, character, spirituality

**UNIT - II**

Engineering Ethics: Senses of Engineering Ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, moral theories, Engineering as social experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study

**UNIT -III**

Safety, Responsibilities and Rights: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, professional rights, employee rights, Whistle blowing

**UNIT - IV**

Collegiality-Techniques for Achieving Collegiality -Two Senses of Loyalty- obligations of Loyalty- misguided Loyalty - professionalism and Loyalty- Professional Rights -Professional Responsibilities - confidential and proprietary information-Conflict of Interest-solving conflict problems - Self-interest, Customs and Religion- Ethical egoism-Collective bargaining

**UNIT -V**

Global Issues: Multinational corporations - environmental ethics, computer ethics, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of ethics, Ethics and codes of business conduct in MNC

***Suggested Readings:***

1. D.R. Kiran, *Professional Ethics and Human Values*, New York: McGraw Hill, 2013.
2. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics and Human Values*, New Delhi: Prentice Hall of India, 2013.
3. Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGraw Hill, 2014.
4. Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.



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**PW4209EC PROJECT STAGE - II**

*Credits: 6*

*Instruction: 12 hours per week  
CIE: 50 marks*

*Duration of SEE: 3 hours  
SEE: 100 marks*

The aim of project work -II is to implement and evaluate the proposal made as part of project work-I. Students can also be encouraged to do full time internship as part of project work-II based on the common guidelines for all the departments. The students placed in internships need to write the new proposal in consultation with industry coordinator and project guide within two weeks from the commencement of instruction.

The department will appoint a project coordinator who will coordinate the following:

1. Re-grouping of students - deletion of internship candidates from groups made as part of project work-I
2. Re-Allotment of internship students to project guides
3. Project monitoring at regular intervals

All re-grouping/re-allotment has to be completed by the 1<sup>st</sup> week of VIII semester so that students get sufficient time for completion of the project.

All projects (internship and departmental) will be monitored at least twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well as by the supervisor. The first review of projects for 25 marks can be conducted after completion of five weeks. The second review for another 25 marks can be conducted after 12 weeks of instruction.

Common norms will be established for the final documentation of the project report by the respective departments. The students are required to submit draft copies of their project report within one week after completion of instruction.

**Note:** Three periods of contact load will be assigned to each project guide.



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**MC42aHS: NSS**

*Credits: 0*

*Instruction: 2 hours per week*

*CIE: 30 marks*

*Duration of SEE: -*

*SEE: -*

**List of Activities:**

1. Orientation programme about the role of NSS in societal development.
2. Swachh Bharat Program.
3. Guest lectures from eminent personalities on personality development.
4. Plantation of saplings/Haritha Haram Program.
5. Blood Donation / Blood Grouping Camp.
6. Imparting computer education to school children.
7. Creating Awareness among students on the importance of Digital transactions.
8. Stress management techniques.
9. Health Check-up Activities.
10. Observation of Important days like Voters' day, World Water Day and so on.
11. Road Safety Awareness Programs.
12. Energy Conservation Activities
13. Conducting Programs on effective communication skills
14. Awareness programs on national integration.
15. Orientation on Improving Entrepreneurial Skills.
16. Developing Effective Leadership skills.
17. Job opportunity awareness programs in various defense, public sector undertakings.
18. Skill Development Program.
19. Creating awareness among students on the Importance of Yoga and other physical activities.
20. Creating awareness among students on various government sponsored social welfare schemes for the people.

**Note:** At least Ten Activities should be conducted in the Semester. Each event conducted under Swachh Bharat, Plantation and important days like Voters' day, world water day may be treated as a separate activity



**B. Tech. (ECE) VIII Semester**

**MC42b: YOGA**

*Credits: 0*

*Instruction: 2 hours per week  
CIE: 30 marks*

*Duration of SEE: -  
SEE: -*

**UNIT - I**

**Introduction:** Yoga definition, health definition from WHO, yoga versus health, basis of yoga, yoga is beyond science, Gist of eighteen chapters of Bhagavad-Gita, four types of yoga: Karma, Bhakti, Gnyana and Raja yoga, Internal and External yoga, elements of Ashtanga yoga (Yama, Niyama, Asana, Pranayama, Prathyahara, Dharana, Dhyana and Samadhi), Panchakoshas and their purification through Asana, Pranayama and Dhyana.

**UNIT - II**

**Suryanamaskaras (Sun Salutations):** Definition of sun salutations, seven chakras (Mooladhaar, Swadhishtaan, Manipura, Anahata, Vishuddhi, Agnya and Sahasrar), various manthras (Om Mitraya, Om Ravaye, Om Suryaya, Om Bhanave, Om Marichaye, Om Khagaye, Om Pushne, Om HiranyaGarbhaye, Om Adhityaya, Om Savitre, Om Arkhaya, and Om Bhaskaraya) and their meaning while performing sun salutations, physiology, seven systems of human anatomy, significance of performing sun salutations.

**UNIT - III**

**Asanas (Postures):** Pathanjali's definition of asana, sthiramsukhamasanam, 3rd limb of Ashtanga yoga, loosening or warming up exercises, sequence of perform in asanas (standing, sitting, prone, supine and inverted), nomenclature of asanas (animals, trees, rishis and so on), asanas versus chakras, asanas versus systems, asanas versus physical health, activation of Annamayakosha.

**UNIT - IV**

**Pranayama (Breathing Techniques):** Definition of Pranayama as per Shankaracharya, 4th limb of Ashtanga yoga, various techniques of breathing, Pranayama techniques versus seasons, bandhas and their significance in Pranayama, mudras and their significance in Pranayama, restrictions of applying bandhas with reference to health disorders, Pranayama versus concentration, pranayama is the bridge between mind and body, pranayama versus mental health, activation of Annamayakosha through Pranayama.

**UNIT - V**

**Dhyana (Meditation):** Definition of meditation, 7th limb of Ashtanga yoga, types of mind (Conscious and Sub-Conscious), various types of dhyana. Meditation versus spiritual health, Dharana and Dhyana, extension of Dhyana to Samadhi, Dhyana and mental stress, activation of Manomayakosha through dhyana, silencing the mind.

***Suggested Readings:***

1. *Light on Yoga* by BKS Iyengar.
2. *Yoga Education for Children, Vol-1* by Swami SatyanandaSaraswati.
3. *Light on Pranayama* by BKS Iyengar.
4. *Asana Pranayama Mudra and Bandha* by Swami SatyanandaSaraswati.
5. *Hatha Yoga Pradipika* by Swami Mukhtibodhananda.
6. *Yoga education for children, Vol-11* by Swami NiranjananandaSaraswati.
7. *Dynamics of Yoga* by Swami SatyanandaSaraswati.