

कमाल Serial No. 1 AW-067093

आधार नं. Aadhaar No. 451863590790

अवकाश संख्या Enrolment No. 1

19-1-HI-700-0024

अनुक्रमांक Roll No. 1

1020253463

# हरियाणा विद्यालय शिक्षा बोर्ड

## Board of School Education Haryana

(ISO 9001 : 2015 CERTIFIED)



माध्यमिक परीक्षा

SECONDARY EXAMINATION

योग्यता प्रमाण-पत्र सह अंकतालिका / Certificate of Qualification cum Mark Sheet



प्रमाणित किया जाता है कि

This is to certify that :

पिता का नाम श्री

TANUJ DUTT VATS

Father's Name Sh.

DEENDAYAL VATS

माता का नाम सुश्री

Mother's Name Ms.

OMPATI

जन्म तिथि / Date of Birth : 09/12/2004 (NINTH DECEMBER TWO THOUSAND FOUR)

विद्यालय का नाम / Name of School जिला / District

LEADING ANGEL PUBLIC SCHOOL AMARDEEP COLONY, HISAR ( HISAR )

बोर्ड द्वारा आयोजित माध्यमिक परीक्षा में प्रविष्ट हुआ / has appeared in Secondary Examination conducted by Board held in MARCH - 2020

एवं निम्नांकित विवरणानुसार उत्तीर्ण घोषित किया गया है &amp; has been declared qualified as per details given below :

क्रमांक Sr. No.	प्राप्तांक / Marks Obtained परिणाम / Result					
	विषय / Subject	प्राप्तांक Marks Obtained	न्यूनतम उत्तीर्ण अंक Minimum Pass Marks	अधिकतम अंक Maximum Marks	श्रेणी Grade	श्रेणी अंक Grade Point
1	HINDI	096	33	100	A+	10
2	ENGLISH	100	33	100	A+	10
3	MATHEMATICS	100	33	100	A+	10
4	SOCIAL SCIENCE	094	33	100	A+	10
5	SCIENCE	099	33	100	A+	10
6	PHYSICAL AND HEALTH EDUCATION	099	33	100	A+	10
कुल योग / Total Marks		494		500	श्रेणी अंक औसत GPA	10.00

टिप्पणी : प्राप्तांकों का योग उन पाँच विषयों पर आधारित है जिनमें छात्र द्वारा बेहतर प्रदर्शन किया गया है।

Note : The total of marks obtained is shown on the basis of "Best Five Scoring" subjects.

सामान्य ज्ञान एवं जीवन कौशल की श्रेणी

General Awareness &amp; Life Skills Grade : EXCELLENT

सह-पाठ्यक्रम कार्यकलाप श्रेणी / Co-Curricular Activity Grade : D



मिहानी Bhiwani

दिनांक Dated : 10/07/2020

जारी करने की तिथि

Issued on Dated : 07/08/2020

सचिव

SECRETARY



**J C BOSE UNIVERSITY OF SCIENCE & TECHNOLOGY, YMCA, FARIDABAD**  
**B.Tech (INFORMATION TECHNOLOGY)**

**Scheme of Studies/Examination**

**Semester V**

S. No	Category	Course Code	Course Title	Hours Per week			Credits	Sessional Marks	Final Marks	Total
				L	T	P				
1	PCC	PCC-CS-501	Database Management Systems	3	0	0	3	25	75	100
2	PCC	PCC-CS-502	Formal Languages, Automata and Compiler Design	3	0	0	3	25	75	100
3	PCC	PCC-CS-503	Object Oriented Programming	3	0	0	3	25	75	100
4	PCC	PCC-CS-602	Computer Networks	3	0	0	3	25	75	100
5	HSMC	HSMC-01	Humanities- I (Effective Technical Communication)	3	0	0	3	25	75	100
6	PEC	PEC*	Elective -I	3	0	0	3	25	75	100
7	MC	MC-01	Constitution of India	2	0	0	0	25	75	100
8	VAC	HSMC (H-102)	Universal Human Values 2: Understanding Harmony	0	0	2	0	15	35	50
9	PCC	PCC-CS-504	Database Management Systems Lab	0	0	4	2	15	35	50
10	PCC	PCC-CS-505	Object Oriented Programming Lab	0	0	4	2	15	35	50
11	Capstone Project	PROJ-CS-501	Project-III	0	0	4	2	25	75	100
<b>Total</b>				<b>22</b>	<b>1</b>	<b>12</b>	<b>24</b>	<b>245</b>	<b>705</b>	<b>950</b>

\* refer to table of streams for Program Elective Courses (PEC) for codes

Note: (a) Theory exams will be of 03 hours duration and Practical exams will be of 02 hours duration



CODE: HSMC-01

SUBJECT NAME : **HUMANITIES- I**

**(EFFECTIVE TECHNICAL COMMUNICATION)**

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

Detailed contents:

### **MODULE 1: INFORMATION DESIGN AND DEVELOPMENT**

Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

### **MODULE 2: TECHNICAL WRITING, GRAMMAR AND EDITING**

Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

### **MODULE 3: SELF DEVELOPMENT AND ASSESSMENT**

Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

### **MODULE 4: COMMUNICATION AND TECHNICAL WRITING**

Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

### **MODULE 5: ETHICS**

Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.



### Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

### TEXT/REFERENCE BOOKS:

1. David F. Beer and David McMurrey, “*Guide to writing as an Engineer*”, John Willey. New York, 2004
2. Diane Hacker, “*Pocket Style Manual*”, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, “*You Can Win*”, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)





CODE: PCC-CS-501

SUBJECT NAME: DATABASE MANAGEMENT SYSTEMS

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

Pre-requisites: Operating Systems

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3. To understand and use data manipulation language to query, update, and manage a Database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Detailed contents:

## MODULE 1: INTRODUCTION

*Database system architecture:* Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

*Data models:* Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

## MODULE 2:

*Relational query languages:* Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

*Relational database design:* Domain and data dependency, Armstrong's axiom, Normal forms, Dependency preservation, Lossless design.

*Query processing and optimization:* Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.



### **MODULE 3: STORAGE STRATEGIES**

Indices, B-trees, hashing

### **MODULE 4: TRANSACTION PROCESSING**

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

### **MODULE 5: DATABASE SECURITY**

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

### **MODULE 6: ADVANCED TOPICS**

Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

### **Course Outcomes**

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement design the databases using E\_R method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling

### **TEXT/REFERENCES**

1. *“Database System Concepts”*, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. *“Principles of Database and Knowledge – Base Systems”*, Vol 1 by J. D. Ullman, Computer Science Press.
3. *“Fundamentals of Database Systems”*, 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. *“Foundations of Databases”*, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley



CODE: PCC-CS-502

SUBJECT NAME: **FORMAL LANGUAGES, AUTOMATA AND COMPILER DESIGN**

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

**Pre-requisites:** Fundamentals of Computers

Course Objectives

1. To introduce formal notation for strings, languages and machines & design finite automata to accept strings of a language.
2. To design context free grammars for a given language and to convert them into normal forms.
3. To introduce context sensitive grammar and unrestricted grammars.
4. To design lexical analyzer and parsers.
5. To generate optimized intermediate code and Machine code for a target machine.

Detailed contents:

### **MODULE-1: FORMAL LANGUAGES AND AUTOMATA THEORY**

Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages, Regular Expression and Finite Automata: Deterministic Finite Automata (DFA) & Nondeterministic Finite Automata (NFA).

Context-free grammars (CFG) and languages (CFL), Ambiguity in CFG, Chomsky and Greibach normal forms, Nondeterministic and deterministic pushdown automata (PDA). Introduction to Context-sensitive languages and linear bounded automata, Introduction to Turing machines.

### **MODULE-2: COMPILER DESIGN-ANALYSIS**

**Phases of compilation and overview, Lexical Analysis (scanner):** scanner generator (lex, flex).

**Syntax Analysis (Parser):** ambiguity LL(1) grammars and top-down parsing, operator precedence parser, bottom up parsing: LR(0), SLR(1), LR(1), and LALR(1).

**Semantic Analysis:** Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.



### MODULE-3: COMPILER DESIGN-SYNTHESIS

**Symbol Table:** Its structure, symbol attributes and management.

**Intermediate Code Generation:** Translation of different language features, different types of intermediate forms, Intermediate code optimization.

**Machine code Generation and optimization:** Instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

Course Outcomes:

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

- a. Understand the different types of grammars such as regular, Context free, and context sensitive grammar.
- b. Design finite state automata for Regular grammar and parser for CFG
- c. Design schemes for semantic analysis.
- d. Develop algorithms to generate and optimize intermediate and machine code.

### TEXT/REFERENCES

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, Pearson Education Asia.
2. John Martin, *Introduction to Languages and The Theory of Computation*, Tata McGraw Hill.
3. Harry R. Lewis and Christos H. Papadimitriou, *Elements of the Theory of Computation*, Pearson Education Asia.
4. K. L. P Mishra, *Theoy of Computation*, PHI.
5. A.V. Aho, M.S. Lam, R. Sethi, and J.D. Ullman, *Compilers:Principles, Techniques, and Tools*, Pearson Education, 2007 (second ed.).
6. K.D. Cooper, and L. Torczon, *Engineering a Compiler*, Elsevier, 2004.





CODE: PCC-CS-503

SUBJECT NAME: **OBJECT ORIENTED PROGRAMMING**

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

Pre-requisites: PCC-CS 301

Course Objectives: The course will introduce standard tools and techniques for software development, using object-oriented approach, use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests.

Detailed contents:

### **MODULE-1: ABSTRACT DATA TYPES**

Decomposition & Abstraction, Abstraction Mechanisms – parameterization, specification, Kind of Abstractions – Procedural, Data, Type hierarchies, Iteration. ADT implementation - Concrete state space, concrete invariant, abstraction function. Implementing operations, illustrated by the Text example

### **MODULE-2: FEATURES OF OBJECT-ORIENTED PROGRAMMING**

Encapsulation, object identity, polymorphism – Inheritance in OO design. Implementing OO language features. - Classes, Objects and variables, Type Checking, Procedures - Commands as methods and as objects, Exceptions, Polymorphic procedures, Templates, Memory management

### **MODULE-3: DESIGN PATTERNS**

Introduction and classification. Creational Pattern – Abstract Factory Pattern, Factory Method, Singleton, Structural Pattern – Bridge, Flyweight, Behavioural Pattern - The iterator pattern, Observer pattern, Model-view-controller pattern

### **MODULE-4: GENERIC TYPES AND COLLECTIONS**

Simple Generics, Generics and Subtyping, Wildcards, Generic Methods, Set Interface, List Interface, Queue Interface, Deque Interface, Map Interface, Object Ordering, SortedSet Interface, SortedMap Interface



## **MODULE-5: GUI. GRAPHICAL PROGRAMMING WITH SCALA AND SWING**

Swing components, Laying out components in a container, Panels, Look & Feel, Event listener, concurrency in swing.

## **MODULE-6: THE SOFTWARE DEVELOPMENT PROCESS**

Requirement specification and analysis, Data Model, Design, Implementation, Testing.

### **Course Outcomes:**

After taking the course, students will be able to:

- a. Specify simple abstract data types and design implementations, using abstraction functions to document them.
- b. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- c. Name and apply some common object-oriented design patterns and give examples of their use.
- d. Design applications with an event-driven graphical user interface.

### **TEXT/REFERENCES**

1. Barbara Liskov, *Program Development in Java*, Addison-Wesley, 2001



CODE: **PCC-CS-602**

SUBJECT NAME: **COMPUTER NETWORKS**

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

Pre-requisites: PCC-CS 402, PCC-CS 403

### **Objectives of the course**

1. To develop an understanding of modern network architectures from a design and performance perspective.
2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. To provide an opportunity to do network programming
4. To provide a WLAN measurement ideas.

Detailed contents:

### **MODULE 1: DATA COMMUNICATION COMPONENTS**

Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

### **MODULE 2: DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER**

Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

### **MODULE 3: NETWORK LAYER**

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.



## **MODULE 4: TRANSPORT LAYER**

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

## **MODULE 5: APPLICATION LAYER**

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

### **Course Outcomes**

After taking the course, students will be able to:

- a. Explain the functions of the different layer of the OSI Protocol.
- b. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
- c. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
- d. For a given problem related TCP/IP protocol developed the network programming.
- e. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

### **TEXT/ REFERENCES**

1. ***“Data Communication and Networking”*, 4th Edition, Behrouz A. Forouzan, McGrawHill.**
2. ***“Data and Computer Communication”*, 8th Edition, William Stallings, Pearson Prentice Hall India.**
3. ***“Computer Networks”*, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.**
4. ***“Internetworking with TCP/IP”*, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.**
5. ***“TCP/IP Illustrated”*, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.**



CODE: MC-01

SUBJECT NAME: **CONSTITUTION OF INDIA**

NO. OF CREDITS 0

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

2 0 0

TOTAL: 100

### **CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES**

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

### **COURSE CONTENT**

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.





3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

#### **TEXT/ REFERENCES:**

1. *“The Constitutional Law Of India” 9th Edition, by Pandey. J. N.*
2. *“The Constitution of India” by P.M.Bakshi*
3. *“Constitution Law of India” by Narender Kumar*
4. *“Bare Act” by P. M. Bakshi* *Course Outcomes*

Students will be able to:

- a. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- b. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- c. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- d. Discuss the passage of the Hindu Code Bill of 1956.



**CODE: HSMC (H-102)**

**SUBJECT NAME: UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY**

**NO OF CREDITS: 0**

**B.TECH SEMESTER V**

**L T P**

**2 1 0**

The value-added courses is for UG/PG students. It may be taught through digital aided learning/class room teaching. Its duration is 35 hours. Minimum 75% attendance is compulsory for students and its evaluation will be done by concerned Dept. through Viva-Voce examination/internal examination.

Pre-requisites: None. Universal Human Values 1 (desirable)

### **OBJECTIVE:**

The objective of the course is fourfold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act

### **Human Values Course**

This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as “ H-102 Universal Human Values 2: Understanding Harmony” is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values –I. This exposure is to be augmented by this compulsory full semester foundation course.



## **Universal Human Values 2: Understanding Harmony**

### **Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

### **Module 2: Understanding Harmony in the Human Being - Harmony in Myself!**

1. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
2. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
3. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

### **Module 3: Understanding Harmony in the Family and Society- Harmony in Human – Human Relationship**

1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship



4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

#### **Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and selfregulation in nature
3. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
4. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

#### **Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
7. Sum up.



Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

## **READINGS:**

### **Text Book**

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

### **Reference Books**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

### **MODE OF CONDUCT (L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits)**

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions. While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice





sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses.

This course is to be taught by faculty from every teaching department, including HSS faculty. Teacher preparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemed essential.

## **ASSESSMENT**

**This is a compulsory non credit course.** The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

Example:

Assessment by faculty mentor : 10 marks

Self –assessment : 10 marks

Assessment by peers : 10 marks

Socially relevant project/Group Activities/Assignments :20 marks

Semester End Examination : 50 marks

The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

## **OUTCOME OF THE COURSE:**

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by

- a) faculty-student or mentor-mentee programs throughout their time with the institution
- b) Higher level courses on human values in every aspect of living. E.g. as a professional



CODE: PEC-IT-I-501

SUBJECT NAME : **SIGNALS AND SYSTEM**

NO OF CREDITS: 3

B.TECH SEMESTER V

SESSIONAL: 25

L T P

THEORY EXAM: 75

3 0 0

TOTAL: 100

Course Objectives:

The aim of the course is for:

1. Understanding the fundamental characteristics of signals and systems.
2. Understanding the concepts of vector space, inner product space and orthogonal series.
3. Understanding signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide.
4. Development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.

Detailed contents:

### **MODULE 1:INTRODUCTION TO SIGNALS AND SYSTEMS**

Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.

### **MODULE 2: BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS**

Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations. State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse responses



### **MODULE 3: FOURIER, LAPLACE AND Z- TRANSFORMS**

Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The DiscreteTime Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.

### **MODULE 4: SAMPLING AND RECONSTRUCTION**

The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

#### **Course Outcomes:**

At the end of this course, students will demonstrate the ability to

- a. Understand the concepts of continuous time and discrete time systems.
- b. Analyse systems in complex frequency domain.
- c. Understand sampling theorem and its implications.

#### **TEXT/REFERENCES**

1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, “*Signals and systems*”, Prentice Hall India, 1997.
2. J. G. Proakis and D. G. Manolakis, “*Digital Signal Processing: Principles, Algorithms, and Applications*”, Pearson, 2006.
3. H. P. Hsu, “*Signals and systems*”, Schaum’s series, McGraw Hill Education, 2010.
4. S. Haykin and B. V. Veen, “*Signals and Systems*”, John Wiley and Sons, 2007.
5. A. V. Oppenheim and R. W. Schaffer, “*Discrete-Time Signal Processing*”, Prentice Hall, 2009.
6. M. J. Robert “*Fundamentals of Signals and Systems*”, McGraw Hill Education, 2007.
7. B. P. Lathi, “*Linear Systems and Signals*”, Oxford University Press, 2009.