Semester IV (Second year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P	C			
1	PC	20APC3606	Computer Organization	3	0	0	3	30	70	100
2	PC	20APC3607	Computer Networks	3	0	0	3	30	70	100
3	PC	20APC3609	Object Oriented Programming through Java	3	0	0	3	30	70	100
4	PC	20APC3611	Operating Systems	3	0	0	3	30	70	100
5	HS	20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
6	HS	20AHS9905	Universal Human Values	3	1	0	3	30	70	100
7	PC Lab	20APC3608	Computer Networks Lab	0	0	3	1.5	30	70	100
8	PC Lab	20APC3610	Object Oriented Programming through Java Lab	0	0	3	1.5	30	70	100
9	PC Lab	20APC3612	Operating Systems Lab	0	0	3	1.5	30	70	100
10	SC	20ASC3602	Server Side Scripting	1	0	2	2	100	0	100
			Total credits				**24.5**	**370**	**630**	**1000**
Community Service Project (Mandatory) for 6 weeks duration during summer vacation. (To visit the selected community to conduct survey (Socio-economic & domain survey) and conduct sensitization/awareness program/activities at the end of IV- semester before commencement of V-semester and complete immersion programme also during V-Semester and submit report in V - semester. Assessment will be done at the end of V-Semester)										
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**0**	**0**	**0**	**3**	0	0	0

Course Code	Computer Organization			L	T	P	C
20APC3606				3	0	0	3
Pre-requisite	Digital Electronics	Semester		II-II			

Course Objectives:

- To learn the fundamentals of computer organization and its relevance to classical and modern
- problems of computer design
- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors

Course Outcomes (CO):

After completion of the course, students will be able to

CO1: Understand computer architecture concepts related to the design of modern processors, memories and I/Os

CO2: Design Arithmetic and control unit

CO3: Identify the hardware requirements of Primary and Secondary memory

CO4: Understand the importance of I/O devices and its interface circuits.

CO5: Identify pipeline hazards and possible solutions to those hazards

UNIT - I	Basic Structure of Computer, Machine Instructions and Programs	9 Hrs

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

UNIT - II	Arithmetic, Basic Processing Unit	9Hrs

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.

UNIT - III	The Memory System	9 Hrs

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT - IV	Input/Output Organization	9 Hrs

Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

UNIT - V	Pipelining, Large Computer Systems	9 Hrs

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General- Purpose multiprocessors, Interconnection Networks.

Textbooks:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.

Reference Books:

1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.
2. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
3. SmrutiRanjanSarangi, "Computer Organization and Architecture", McGraw Hill Education.
4. John P.Hayes, "Computer Architecture and Organization", McGraw Hill Education

Online Learning Resources:

https://nptel.ac.in/courses/106/103/106103068/

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2											
CO2	2	2	2										2	
CO3	1													
CO4	2													1
CO5	2	2	2										2	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Computer Networks			L	T	P	C
20APC3607				3	0	0	3
Pre-requisite		Semester			II-II		

Course Objectives:

The students will be able to
- run and manage the Internet, part of the Internet, or an organization's network that is connected to the Internet.
- understand the basics of data communications and networking
- the protocols used in the Internet communication

Course Outcomes (CO):

After completion of the course, students will be able to
   Student will be able to
CO1: understand the basics of data communications and networking
CO2: classify the functionalities of two sub layers of Data link Layer
CO3: know briefly about Network Layer through algorithms and protocols
CO4: distinguish the services provided by Transport Layer
CO5: recognize the services offered by Application Layer to the user

UNIT - I	Introduction	9 Hrs

Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration.
Network Models: Protocol Layering, TCP/IP Protocol Suite, The OSI Model
Introduction to Physical Layer: Data and Signals, Transmission Impairment, Data Rate Limits, Performance.
Transmission Media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet Switching

UNIT - II	The Data Link Layer	9Hrs

The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol.
Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

UNIT - III	The Network Layer	9 Hrs

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking.
The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT – IV	The Transport Layer	9 Hrs

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

UNIT – V	The Application Layer	9 Hrs

The Application Layer: Introduction, Client-Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Textbooks:

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

Reference Books:

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture - Volume 1, Douglas E. Comer, 5th edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
5. "Computer Networks and Internets with Internet Applications", Comer.

Online Learning Resources:

https://www.youtube.com/watch?v=O--rkQNKqls&list=PLbRMhDVUMngf-peFloB7kyiA40EptH1up

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	2	3											2	
CO3	2	2	3		1								2	
CO4	2	3	3		2								3	2
CO5	2	2											1	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Object Oriented Programming through Java		L	T	P	C
20APC0512			3	0	0	3
Pre-requisite NIL		Semester		II-II		

Course Objectives:

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

- To understand object oriented programming concepts, and apply them in solving Problems.
- To introduce the principles of inheritance and polymorphism and implementation of packages and interfaces.
- To learn java's exception handling mechanism, String Handling Methods.
- To introduce the concepts of multithreading and Collection Framework and internet programming using applets.
- To introduce the design of Graphical User Interface swing controls.

Course Outcomes (CO):

CO1: Understanding the Syntax, Semantics and features of Java Programming Language.
CO2: To gain knowledge on Object Oriented Programming concepts.
CO3: Raise Exceptions and handle exceptions.
CO4: Analyze the method of creating Multi-threading programs
CO5: Ability to create GUI applications & perform event handling.

UNIT - I		9Hrs

Object Oriented Thinking: History of Java, Java Buzzwords, Overview of OOP CLASSES AND Objects: Classes, Objects, Simple Java Program, Methods, Constructors, this Keyword, Garbage Collection, Data Types, Variables, Arrays, Operators, Control Statements Overloading of Methods and Constructors, Parameter Passing, Recursion, String Class and String handling methods.

UNIT - II		9 Hrs

Inheritance: Inheritance Basics, Using Super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance, Object Class.
Packages: Packages, Access Protection, Importing Packages.
Interfaces: Defining an Interface, Implementing Interface, Applying Interface, Variables in Interfaces, Interfaces can be extended.

UNIT - III		8Hrs

Exception Handling: Exception Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built in Exceptions, Creating Own Exception Sub Classes.
Input and Output Operations: I/O basics, reading console input, writing console output, the PrintWriter class, reading and writing files, automatically closing a file.
Generic Programming : Generic classes, generic methods, Bounded Types, Restrictions and Limitations.

UNIT - IV		8 Hrs

Multithreading: Java Thread Model, The Main Thread, Thread Life Cycle, Creating Thread and Multiple Threads, isAlive() and join(), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming and Stopping Threads.
Collection Framework: Collection Overview, Collection Interfaces: The Collection Interface, the List Interface, the Queue Interface, Collection Classes: Array List Class, Linked List Class, String Tokenizer, Scanner.

UNIT - V		10Hrs

Applets: Applet Basics, Life Cycle of an Applet, Simple Applet Display Methods, The HTML APPLET tag, Passing Parameters to Applets.
Swing: Introduction to Swing Model-View, Controller design pattern button, layout management, Swing Components.

Textbooks:

Herbert Schildt, Java. The complete reference, TMH. 9thEdition, 2014
Cay. S. Horstmann and Gary Cornell Core Java 2, Vol 2, Advanced Features, Pearson Education, 7thEdition, 2004

Reference Books:

1. J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education 6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development.
4. P. Radha Krishna, Object Oriented Programming through Java, University Press.

Online Learning Resources:

www.javatpoint.com

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3								1	1
CO2	1	1	3										1	1
CO3	1		3	1									1	1
CO4	1	2	3										1	1
CO5	2	1	2		3								1	1

Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Operating Systems		L	T	P	C
20APC0515			3	0	0	3
Pre-requisite	Basics of CO and DBMS	Semester			II-II	

Course Objectives:

The course is designed to
- Understand basic concepts and functions of operating systems
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
- Familiarize with the basics of the Linux operating system
- Implement various schemes for achieving system protection and security

Course Outcomes (CO):

After completion of the course, students will be able to
CO1: Distinguish between the different types of operating system environments.
CO2: Apply the concepts of process synchronization & CPU scheduling
CO3: Develop solutions to deadlock and memory management
CO4: Analyze various disk scheduling algorithms and file system interfaces
CO5: Analyze the various security issues and goals of protection

UNIT - I		9 Hrs

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems
System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.
Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT - II		10Hrs

Threads: overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.
Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.
CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT - III		8Hrs

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.
Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory
Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT - IV		9Hrs

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.
File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.
File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT - V		8Hrs

	I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.
	Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection
	Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Textbooks:

1.   Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley, Eight Edition, 2018

Reference Books:

1.   Operating systems by A K Sharma, Universities Press,
2.   Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3.   Operating Systems, A.S.Godbole, Second Edition, TMH.
4.   An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
5.   Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
6.   Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
7.   Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
8.   Operating System Desgin, Douglas Comer, CRC Press, 2nd Edition.
9.   Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.

Online Learning Resources:

   https://nptel.ac.in/courses/106/106/106106144/ http://peterindia.net/OperatingSystems.html

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2											1	1
CO2	2												1	1
CO3	3	3	3										2	2
CO4			2	2									2	2
CO5	2	2										1	2	2

   (Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Managerial Economics And Financial Analysis (Common to : CSE, CIC, AIM, AID)		L	T	P	C
20AHSMB01			3	0	0	3
Pre-requisite	NIL	Semester			II-II	

Course Objectives:
- To understand the concepts of managerial economics and financial analysis this helps in optimal decision making in business environment.
- To be familiar with demand concepts, types of methods or techniques of demand those are used by the entrepreneur or producer.
- To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production.
- To introduce the concepts of cost and significance, limitation of Break even analysis.
- To provide the optimal decisions acquiring the knowledge on financial accounting and its analysis

Course Outcomes (CO):

After completion of this course, the student will able,
- **CO1:** Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
- **CO2:** Apply the Concept of Production cost and revenues for effective Business decision
- **CO3:** Analyze how to invest their capital and maximize returns.
- **CO4:** Evaluate the capital budgeting techniques.
- **CO5:** Define the concepts related to financial accounting and management and able to develop the Accounting statements and evaluate the financial performance of business entity.

UNIT - I	Managerial Economics	8Hrs

Introduction – meaning, nature, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.

UNIT - II	Production and Cost Analysis	10Hrs

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost& Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT - III	Business Organizations and Markets	8Hrs

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

UNIT - IV	Capital Budgeting	9Hrs

Introduction to Capital, Sources of Capital. Short-term and Long-term Capital : Working capital, types, Estimating Working capital requirements. Capital Budgeting – Features, Proposals, Time value of money. Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), and Internal Rate Return (IRR) Method (simple problems).

UNIT - V	Financial Accounting and Analysis	8Hrs

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profitand Loss Account and Balance Sheet with simple adjustments). *Financial Analysis* - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt https://www.slideshare.net/rossanz/production-and-cost-45827016 https://www.slideshare.net/darkyla/business-organizations-19917607 https://www.slideshare.net/balarajbl/market-and-classification-of-market https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396 https://www.slideshare.net/ashu1983/financial-accounting.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3						1				1			
CO2	1	2												
CO3	2					1								
CO4											3			
CO5				2							2			

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Universal Human Values		L	T	P	C
20AHS9905	**(Common to : CSE, CIC, AIM, AID)**		3	1	0	3
Pre-requisite	**NIL**	**Semester**		**II-II**		

Course Objectives :

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

Course Outcomes (CO):

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

CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature)

CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3: They would have better critical ability.

CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

CO5: 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.

UNIT - I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**	8Hrs

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current. scenario
- Method to fulfill 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. .

UNIT - II	**Understanding Harmony in the Human Being - Harmony in Myself!**	10Hrs

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- 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.

UNIT -III	**Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship.**	8Hrs

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- 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

UNIT –IV	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence	9Hrs

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- 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.

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.

UNIT – V	Implications of the above Holistic Understanding of Harmony on Professional Ethics.	8Hrs

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- 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.
- Case studies of typical holistic technologies, management models and production systems
- 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
- 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.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

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

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2				2		2		
CO2	3	2				2				2		2		
CO3	3											1		
CO4	3											1		
CO5	3	2				3				2		2		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Computer Networks Lab			L	T	P	C
20APC3608				0	0	4	2
Pre-requisite	NIL		Semester		II-II		

Course Objectives:

This course is designed to:
- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking commands supported by operating system
- Impart knowledge of Network simulator 2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

Course Outcomes (CO):

Upon completion of the course, the students should be able to:
CO1: Deal with Error detection/ correction techniques
CO2: Learn about Data link layer protocols
CO3: Learn about network layer protocols
CO4: Able to get knowledge about simulator

List of Experiments:

1. Implementation of Error Detection / Error Correction Techniques
2. Implementation of Stop and Wait Protocol and sliding window
3. Implementation and study of Go-back-N and selective repeat protocols
4. Implementation of High Level Data Link Control
5. Write a socket Program for Echo/Ping/Talk commands.
6. To create scenario and study the performance of network with CSMA / CA protocol and   comparewith CSMA/CD protocols.
7. Implementation of Link state routing algorithm
8. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
9. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
10. Develop a simple data link layer that performs the flow control using the sliding window protocol,and loss recovery using the Go-Back-N mechanism.
11. Implement Dijsktra's algorithm to compute the shortest path through a network
12. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
13. Implement distance vector routing algorithm for obtaining routing tables at each node.
14. Write a program for congestion control using Leaky bucket algorithm.
15. Do the following using NS2 Simulator
    a. NS2 Simulator-Introduction
    b. Simulate to Find the Number of Packets Dropped
    c. Simulate to Find the Number of Packets Dropped by TCP/UDP
    d. Simulate to Find the Number of Packets Dropped due to Congestion
    e. Simulate to Compare Data Rate& Throughput.
    f. Simulate to Plot Congestion for Different Source/Destination
    g. Simulate to Determine the Performance with respect to Transmission of Packets

References:

1. Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, "TCP/IP Essentials A Lab-Based Approach", Cambridge University Press, 2004.
2. Cisco Networking Academy, "CCNA1 and CCNA2 Companion Guide", Cisco Networking Academy Program, 3rd edition, 2003.
3. Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.
4. Elloitte Rusty Harold, "Java Network Programming", 3rd edition, O'REILLY, 2011.

Online Learning Resources/Virtual Labs:

http://www.edx.org

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3									2	
CO2	3													
CO3	3													
CO4	3													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Object Oriented Programming through Java Lab		L	T	P	C
20APC3610			0	0	4	2
Pre-requisite	**NIL**	**Semester**		**II-II**		

Course Objectives:

- To experiment with the syntax and semantics of java language and gain experience with java programming
- Learn to use object orientation to solve problems and use java language to implement them.

Course Outcomes (CO):

CO1: Demonstrate java compiler and eclipse platform and learn how to use net beans IDE to create java
    application
CO2: Ability to create user friendly interfaces
CO3: Ability to solve the problem using object oriented approach and design solutions which are robust
CO4: Implement exception handling and Templates
CO5: Ability to create GUI components and implementations

List of Experiments:

Week-1: (Unit-1)
Installation of Java software, study of any integrated development environment, Use   Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class and run it.
Practice Java Basic Programs on Classes and Objects.

Week-2: (Unit-1)
Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Commute the bill amount using the following tariff.
If the type of the EB connection is domestic, calculate the amount to be paid as follows:
First 100 units - Rs. 1 per unit; 101-200 units - Rs. 2.50 per unit; 201 -500 units - Rs. 4 per unit;
501 units - Rs. 6 per unit. If the type of the EB connection is commercial, calculate the amount to be paid as follows:
First 100 units - Rs. 2 per unit; 101-200 units - Rs. 4.50 per unit; 201 -500 units - Rs. 6 per unit; > 501 units - Rs. 7 per unit.
Write a java program to illustrate the concept of class with method overloading.   C) Write a java program to illustrate the concept of class with Constructors overloading.

Week-3:(Unit-2)
a) Write a program to create a class named shape. It should contain 2 methods, draw() and erase() that prints "Drawing Shape" and "Erasing Shape" respectively. For this class, create three sub classes, Circle, Triangle and Square and each class should override the parent class functions - draw () and erase (). The draw() method should print "Drawing Circle", "Drawing Triangle" and "Drawing Square" respectively. The erase() method should print "Erasing Circle", "Erasing Triangle" and "Erasing Square" respectively. Create objects of Circle, Triangle and Square in the following way and observe the polymorphic nature of the class by calling draw() and erase() method using each object. Shape c=new Circle(); Shape t=new Triangle(); Shape s=new Square();
b) Write a Java Program to demonstrate inheritance &usage of super

Week-4:(Unit-2)
Write a Java Program to implement multilevel inheritance.
Write a Java program to implement the method overriding
Write a Java program to implement dynamic method dispatch.

Week-5:(Unit-2)
Write a Java program to implement abstract class.
Write a Java Program to implement Packages.
Write a Java Program to implement Access Protection in Packages.

Week-6:(Unit-2)
Write a Java program to demonstrate interfaces.
Write a Java program to implement the multiple inheritance using interfaces.

Week-7:(Unit-3)
Write a Java program to implement the exception handling mechanism.
Write a Java program to implement the nested try statement.
Write a Java program to implement your own exception class.

Week-8:(Unit-3)
Write a Java Program to demonstrate the following String Handlings.
String Length& Concatenation.
Character Extraction.
String Comparison.
Searching and modifying String.
Write a Java Program to demonstrate String Buffer Class.

Week-9:(Unit-4)
Write a Java program for multi-thread implementation.

Write a Java program to implement producer consumer problem using inter-thread communication mechanism.
Week-10:(Unit-4)
Practice any two Programs on Collections.
Practice any two Programs on String Tokenizer & Scanner.
Week-11:(Unit-5)
Write a Java Program to develop an applet that displays a simple message.
Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named ─Compute‖ is clicked.
Write a java program to handle keyboard events.
Write a java program to handle Mouse events
Week-12:(Unit-5)
Write a Java Program to demonstrate AWT Label & Button.
Write a Java Program to demonstrate JLabel, JTextField & JButton.
Write a program to design a calculator using event driven programming paradigm of java

References:

1. Herbert Schildt.Java. The complete reference, TMH. 9thEdition.
2. H.M.Dietel and P.J.Dietel, Java How to Program 6thEdition,PearsonEducation/PHI
3. Y.Daniel Liang, Introduction to Java programming, Pearson Education, 6thEdition.
4. Cay Horstmann, Big Java, 2ndedition, Wiley Student Edition, Wiley India Private Limited.

Online Learning Resources/Virtual Labs:

http://www.javatpoint.com

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1		3									
CO2	2	2	2											
CO3	1	2	2	1										
CO4		1	2	2										
CO5		1	2	2	3			3						

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Operating Systems Lab		L	T	P	C
20APC3612			0	0	3	1.5
Pre-requisite	Basics of CO and DBMS	Semester			II-II	

Course Objectives:

- To understand the design aspects of operating system
- To solve various synchronization problems

Course Outcomes (CO):

CO1: Ensure the development of applied skills in operating systems related areas.
CO2: Able to write software routines modules or implementing various concepts of operating system.

List of Experiments to be implemented in C/Java

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls Fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms: a) Round Robin b) SJF c) FCFS d) Priority
5. Simulate all file allocation strategies: a) Sequential b) Indexed c) Linked
6. Simulate MVT and MFT
7. Simulate all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG
8. Simulate Bankers Algorithm for Deadlock Avoidance
9. Simulate Bankers Algorithm for Deadlock Prevention
10. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU Etc. …
11. Simulate Paging Technique of memory management
12. Control the number of ports opened by the operating system with a) Semaphore b) monitors
13. Simulate how parent and child processes use shared memory and address space
14. Simulate sleeping barber problem
15. Simulate dining philosopher's problem
16. Simulate producer and consumer problem using threads (use java)
17. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
18. Develop a code to detect a cycle in wait-for graph
19. Develop a code to convert virtual address to physical address
20. Simulate how operating system allocates frame to process
21. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

References:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth Edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition–2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI.

Online Learning Resources/Virtual Labs:

https://www.cse.iitb.ac.in/~mythili/os/
http://peterindia.net/OperatingSystems.html

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2									2	
CO2		3	3	3									2	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Server Side Scripting		L	T	P	C
20ASC3602			1	0	2	2
Pre-requisite	HTML, JavaScript	Semester		II-II		

Course Objectives:

- To learn about Java, HTML , DHTML concepts.
- To know about server side programming
- To gain the Knowledge of XML and its applications

Course Outcomes (CO):

CO1: Learn the installation guide of MYSQL,XAMPP5,APACHE and PHP
CO2: Able to design code for simple dynamic web pages
CO3: Design PHP and SQL/MySQL Integration.
CO4: Design Basic Projects
CO5: Able to provide protection to web server

UNIT - I		10 Hrs

Getting Up and Running: Installation Quick Start Guide with XAMPP5 - Installing and Configuring MySQL - Installing and Configuring Apache - Installing and Configuring PHP -
PHP Language Structure: The Building Blocks of PHP - Flow Control Functions in PHP - Working with Functions - Working with Arrays - Working with Objects

1. Installation of XAMPP server
2. Write PHP code to print Hello World program
3. Demonstrate 8 basic data types in PHP.
4. Demonstrate the scope of variables declared in PHP code.
5. Demonstrate Arithmetic, Comparison, Logical (or Relational), Assignment and Conditional (or ternary) Operators.
6. Demonstrate if, elseif ...else and switch statements.
7. Demonstrate for, while, do – while, and for each loop.
8. Write code to create and access numeric arrays.
9. Demonstrate the usage of associative arrays.
10. Implement Multi-dimensional arrays
11. Create a multidimensional array of movies organized by genre. This should take the form of an associative array with genres as keys, such as Science Fiction, Action, Adventure, and so forth. Each of the array's elements should be an array containing movie names, such as Alien, Terminator 3, Star Wars, and so on. After creating your arrays, loop through them, printing the name of each genre and its associated movies.
12. Create a function that accepts four string variables and returns a string that contains an HTML table element, enclosing each of the variables in its own cell.
13. Create a class called baseCalc() that stores two numbers as properties. Next, create a calculate() method that prints the numbers to the browser.
14. Create classes called addCalc(), subCalc(), mulCalc(), and divCalc() that inherit functionality from baseCalc() but override the calculate() method and print appropriate totals to the browser.

UNIT - II		10 Hrs

Working with Strings, Dates, and Time - Working with Forms - Working with Cookies and User Sessions - Working with Files and Directories - Working with Images

1. Create a feedback form that accepts a user's full name and an email address. Use case-conversion functions to capitalize the first letter of each name the user submits and print the result back to the browser. Check that the user's email address contains the @ symbol and print a warning otherwise.
2. Create an array of doubles and integers. Loop through the array, converting each element to a floating-point number with a precision of 2. Right-align the output within a field of 20 characters.
3. Create a birthday countdown script. Given form input of month, day, and year, output a message that tells the user how many days, hours, minutes, and seconds until the big day.
4. Create a calculator script that enables the user to submit two numbers and choose an operation (addition, multiplication, division, or subtraction) to perform on them.
5. Use hidden fields with the script you created in activity 1 to store and display the number of requests that the user submitted.
6. Create a script that uses session functions to track which pages in your environment the user has visited.
7. Create a new script that will list for the user all the pages he/she has visited within your environment, and when.
8. Create a form that accepts a user's first and second name. Create a script that saves this data to a file.
9. Create a script that reads the data file you created in the first activity. In addition to writing its contents to the browser (adding a tag to each line), print a summary that includes the number of lines in the file and the file's size.
10. Draw a New Image, shapes and lines.
11. Create a New Image with Color Fills.

12. Draw A Basic Pie Chart and 3D Pie Chart 13. Creating a New Image from an Existing Image. 14. Creating an Image from User Input. 15. Creating an Image with Custom Font and Text		
UNIT - III	**PHP with database connectivity**	10 Hrs

Understanding the Database Design Process - Learning Basic SQL Commands - Using Transactions and Stored Procedures in MySQL - Interacting with MySQL Using PHP

Write PHP code

1. to open and close a database connection.
2. to select a database. to select a database.
3. to create a table
4. to drop a database.
5. to drop a table
6. to insert record into employee table.
7. take input using HTML Form and insert records into table.
8. to display all the records from employee table.
9. to display all the records from employee table using mysql_fetch_assoc() function.
10. to display all the records from employee table using MYSQL_NUM argument.
11. to release cursor memory at the end of SELECT statement.
12. to display 10 records per page.
13. to take user input of employee ID and update employee salary.
14. to take user input of employee ID and delete an employee record from employee table.
15. Use SELECT INTO OUTFILE query for creating table backup.

UNIT - IV		10 Hrs

Managing a Simple Mailing List - Creating an Online Address Book - Creating a Simple Discussion Forum - Creating an Online Storefront - Creating a Shopping Cart Mechanism - Creating a Simple Calendar - Restricting Access to Your Applications - Logging and Monitoring Web Server Activity - Application Localization - Working with XML and JSON

1. Common Functions in an Included File
2. Subscribe and Unsubscribe with manage.php
3. Send Mail to Your List of Subscribers
4. Modify the manage.php script to display the user's email as part of the response message for any action that is taken.
5. Modify the sendmymail.php script to add additional form fields that will correspond to section headings in the message string itself. Remember that when the form is submitted, those strings will have to be concatenated into one message string that is sent to the mail() function.

UNIT - V		5 Hrs

Apache Performance Tuning and Virtual Hosting - Setting Up a Secure Web Server - Optimizing and Tuning MySQL - Performing Software Upgrades - Using Application Frameworks

Textbooks:

1. Sams Teach Yourself PHP, MySQL and Apache All in One, by Julie C. Meloni, Pearson Education, Inc © 2012.
2. Beginning PHP6, Apache, MySQL Web Development, by Timothy Boronczyk, Elizabeth Naramore,

Reference Books:

1. Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass, Wiley Publishing, Inc © 2009
2. PHP 6 and MySQL 6 Bible, by Steve Suehring, Tim Converse, Joyce Park, Wiley Publishing, Inc © 2009.
3. PHP & MySQL Web Development All-in-One Desk Reference For Dummies, by Janet Valade with Tricia Ballad and Bill Ballad, Wiley Publishing, Inc © 2008.

Online Learning Resources:

www.nptelvideos.com, https://www.tutorialspoint.com/php/

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1													
CO2	1													
CO3	1		2		2				2	1	2	3		2
CO4	1													
CO5	1													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)