Vision of the Department	To produce a blend of creativity & ethical engineering graduates and making them capable of facing the real life challenges.
Mission of the Department	The mission elements of Computer Science & Engineering Department are: M-1. Inculcating the fundamentals of computer science & engineering and analyzing the engineering problems along with the development of solutions keeping environmental aspects. M-2. To cultivate ability for modern tool usage on ethical grounds to widely solve real life issues. M-3. Building team spirit within the students, creating effecting communication for lifelong learning.

Programmed Outcomes
Programme Outcomes

1. To solve complex engineering problems by applying the knowledge of mathematics, algorithms,computing principles.
2. Identify and analyze complex engineering problems and define requirements appropriate for it.
3. To design and impement computer based systems and programs to meet desired needs.
4. To provide valid conclusions by using research based knowledge and research methods.
5. To use modern tools necessary for computing practice.
6. To understand the issues related to society by using reasoning.
7. To understand the issues realted to enviornmetal context for strentheing of engineering solutions.
8. An understanding of ethical responsibility.
9. To work effectively as team member for the accomplishment of goals.
10 To communicate effectively with community and society.
11. to design and develop various project economically with planning.
12. To engage in life-long learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO: 1 To provide quality computer education to inculcate modern technical skills among the students.

PEO: 2 To cultivate the ability to analyze the demand of software industry for carrying out hands on projects.

PEO: 3 Inculcate direction qualities to work mutually as a team member with effective briefing skills.

Bachelor of Technology (Computer Science and Engineering)
Credit Based Scheme of Studies/Examination(Modified)
Semester IV (w.e.f Session 2021-2022)

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	PC-CS-202A	Discrete Mathematics	3:0:0	3	3	75	25	0	100	3
2	PC-CS-204A	Internet Technology and Management	3:0:0	3	3	75	25	0	100	3
3	PC-CS-206A	Operating Systems	3:0:0	3	3	75	25	0	100	3
4	PC-CS-208A	Design and Analysis of Algorithms	3:0:0	3	3	75	25	0	100	3
5	HTM-901A	Universal Human Values II : Understanding Harmony	3:0:0	3	3	75	25	0	100	3
6	PC-CS-210AL	Internet Technology and Management Lab	0:0:4	4	2	0	40	60	100	3
7	PC-CS-212AL	Operating Systems Lab	0:0:4	4	2	0	40	60	100	3
8	PC-CS-214AL	Design and Analysis of Algorithms Lab	0:0:4	4	2	0	40	60	100	3
		Total		**27**	**21**	**375**	**245**	**180**	**800**	

9	MC-901A*	Environmental Sciences	3:0:0	3	0	75	25	0	100	3

***MC-901A is a mandatory credit-less course and student has to get passing marks in order to qualify for the award of B.Tech. Degree.**

PC-CS202A	Discrete Mathematics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3**
Purpose	To provide the conceptual knowledge of Discrete structure.						
Course Outcomes (CO)							
CO1	To study various fundamental concepts of Set Theory and Logics.						
CO2	To study and understand the Relations, diagraphs and lattices.						
CO3	To study the Functions and Combinatorics.						
CO4	To study the Algebraic Structures.						

Unit 1 Set Theory and Logic

Fundamentals - Sets and subsets, Venn Diagrams, Operations on sets, Laws of Set Theory, Power Sets and Products, Partition of sets, The Principle of Inclusion- Exclusion.

Logic : Propositions and Logical operations, Truth tables, Equivalence, Implications, Laws of Logic, Normal forms, Predicates and quantifiers, Mathematical Induction.

Unit 2: Relations, diagraphs and lattices

Product sets and partitions, relations and diagraphs, paths in relations and diagraphs, properties of relations, equivalence and partially ordered relations, computer representation of relations and diagraphs, manipulation of relations, Transitive closure and Warshall's algorithm, Posets and Hasse Diagrams, Lattice.

Unit 3 Functions and Combinatorics

Definitions and types of functions: injective, subjective and bijective, Composition, identity and inverse, Review of Permutation and combination-Mathematical Induction, Pigeon hole principle, Principle of inclusion and exclusion, Generating function-Recurrence relations.

Unit 4: Algebraic Structures

Algebraic structures with one binary operation - semi groups, monoids and groups, Product and quotient of algebraic structures, Isomorphism, homomorphism, automorphism, Cyclic groups, Normal sub group, codes and group codes, Ring homomorphism and Isomorphism**.**

Suggested Books:

- Elements of Discrete Mathematics C.L Liu, 1985, Reprinted 2000, McGraw Hill
- Discrete Mathematics - Revised (SIE) (Schaum's Outline Series), LIPSCHUTZ , TMH
- Discrete mathematical structures by B Kolman RC Busby, S Ross PHI Pvt. Ltd.
- Discrete Mathematical Structures with Applications to Computer Science , by Tremblay J.P, and Manohar R., McGraw Hill Book Company, 1975, International Edition, 1987.
- Discrete and Combinatorial mathematics ", Ralph P., Grimaldi, Addison-Wesley Publishing Company, Reprinted in 1985.
- Discrete Mathematics and its Applications ", Kenneth H.Rosen, McGraw Hill Book Company, 1999. Sections: 7.1 to 7.5.
- Discrete Mathematics for computer scientists and Mathematicians, Joe L. Mott, Abraham

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

Lesson Plan (Discrete Mathematics)

Weekly	Theory	
	Lecture Day	Topic (including assignment/tes)
Unit-I	Fundamentals - Sets and subsets	Teaching
Week-1	Venn Diagrams	Teaching
	Operations on sets	Teaching
	Laws of Set Theory	Teaching
	Power Sets, Products and Partition of sets	Teaching
	The Principle of Inclusion- Exclusion	Teaching
Week-2	Logic : Propositions and Logical operations	Teaching
	Logic : Propositions and Logical operations	Teaching
	Truth tables, Equivalence	Teaching
	Implications, Laws of Logic	Teaching
Week-3	Normal forms	Teaching
	Predicates and quantifiers	Teaching
	Mathematical Induction.	Teaching
	Assignment	Assignment
Unit-II	Product sets and partitions, relations	Teaching
Week-4	relations and diagraphs	Teaching
	paths in relations and diagraphs	Teaching
	properties of relations,	Teaching
Week-5	equivalence and partially ordered relations	Teaching
	computer representation of relations and diagraphs	Teaching
	manipulation of relations	Teaching
	Transitive closure	Teaching
Week-6	Warshall's algorithm	Teaching
	Posets and Hasse Diagrams	Teaching
	Lattice	Teaching
	Lattice continue	Teaching
	Assignment	Assignment
Unit-III	Definitions and types of functions	Teaching
Week-7	injective, subjective and bijective	Teaching
	Composition, identity and inverse	Teaching
	Review of Permutation and combination	Teaching
Week-8	Mathematical Induction	Teaching
	Pigeon hole principle	Teaching
	Principle of inclusion and exclusion	Teaching
Week-9	Generating function.	Teaching
	Recurrence relations	Teaching
	Assignment	Assignment
Unit-IV	Algebraic structures with one binary operation - semi groups	Teaching
Week-10	monoids and groups	Teaching
	Product of algebraic structures	Teaching
	quotient of algebraic structures	Teaching
Week-11	Isomorphism, homomorphism, automorphism	Teaching

Week-12	Isomorphism, homomorphism, automorphism continue	Teaching
	Cyclic groups	Teaching
	Normal sub group	Teaching
	codes and group codes	Teaching
	Ring	Teaching
	Ring homomorphism and Isomorphism	Teaching
	Assignment	Assignment
	Week-13 for revision	

Discrete Mathematics (PC-CS202A)

Time: Three Hours
[Maximum Marks:80

Paper- PC-CS202A

Note : Attempt five questions, selecting at least one question from each part.

Q1 (i) Let $A = \{2, 6, 8\}, B = \{3, 5, 7\}, C = \{-1, 4, 5\}$, compute $A - (B - C)$, $A \cap (B - C)$ and $(A \Delta B) \Delta C$.

(ii) If $A = \{2, 4, 6, 8\}$ and a relation R on A is defined as $R = \{(x, y): x + y \leq 8\}$. Is R refelexive, symmetric and transitive. Also write the relation matrix.

(iii) If f, g are functions from R to R defined by $f(x) = x + 2$, $g(x) = x^2 + 2$, find $f \circ g$ and f^2.

(iv) In a group G, prove that $(a * b)^{-1} = a^{-1} * b^{-1}$, for every $a, b \in G$ where $*$ is a binary composition on G.

(v) If $A = \{1, 2\}$ and $B = \{3, 4\}$, find $(A \times B) \cup (B \times A)$ and $(A \times B) \cap (B \times A)$. 5x3=15

PART-B

Q2 Prove the following propositions are equivalent to $p \rightarrow q$:
(i) $\sim(p \wedge \sim q)$ (ii) $\sim p \vee q$ (iii) $\sim q \rightarrow \sim p$.

Q3 Let the relation $(x, y) \in R \; if \; x \geq y$ defined on set of positive integers. Is R a partial order relation? Prove or disprove it.

Q4 Solve the recurrence relation $S_n - 7S_{n-1} + 10S_{n-2} = 0, S_0 = 0, S_1 = 3$by using generating function where$S_n \geq 2$.

Q5 Let R be a ring with unity and $(a * b)^2 = a^2 * b^2$ for every $a, b \in R$. Show that R is a commutative ring

4x5=20

PART-C

Q6 Prove for any three sets A, B, and C that
(a) (i) $A \cap (B - C) = (A \cap B) - (A \cap C)$
(ii) $A - (B - C) = (A - B) \cup (A \cap C)$
(b) (i) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
(ii) $(A - B) \times C = (A \times C) - (B \times C)$

Q7 Among 100 students 32 study maths ,20 study physics, 45 study biology, 15 study maths and biology , 7 study maths and physics,10 study physics and biology and 30 do not

study

any of the three subjects. Find the no. of students studying all the three subject. Find the no. of student studying exactly one of the three subject

Q8 Consider an algebric system $(Q,*)$, Q denotes the set of rational numbers and where $*$ is a binary composition defined by $a * b = a + b - ab$ for all $a, b \in Q$. Determine $(Q,*)$ is a

group or not.

Q9 State and prove, Pigeon hole principle.

Tutorial sheet 1

1. For any two sets A and B, then prove that
   i) $(A \cap B) \cup (A \cap B) = A$
   ii) $(A - B) \cap B = \Phi$
2. State and prove D'Morgan 's law.
3. Prove that conjuction ($\wedge$) is associative.
4. Prove tha $(p \leftrightarrow q)$ is equivalent to $(p \rightarrow q) \wedge (q \rightarrow P)$.
5. Prove that N X N is countable.
6. Show that

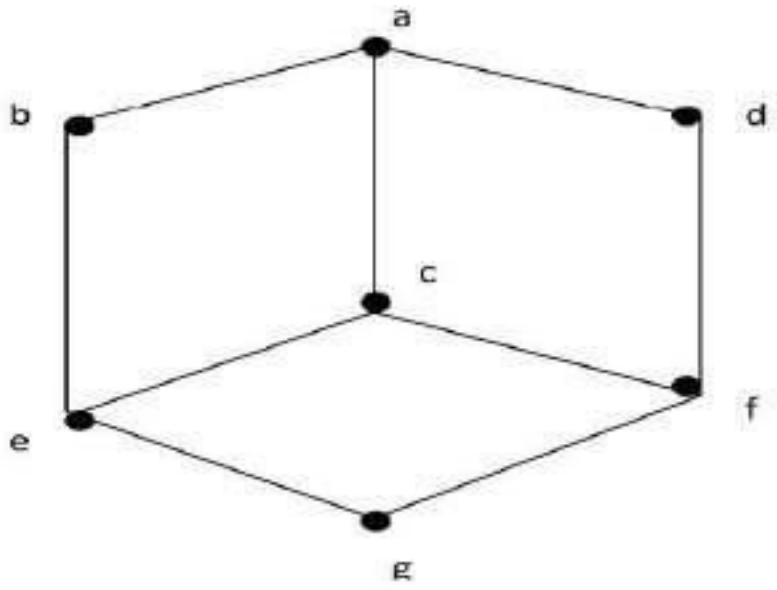
$$\frac{1^2}{1.3} + \frac{2^2}{3.5} + \ldots\ldots + \frac{n^2}{(2n-1)(2n+1)} = \frac{n(n+1)}{2(2n+1)}$$

Tutorial sheet 2

1. Define the following
   i). one one
   ii) onto
   iii) many one into
2. Define a relation and inverse relation . prove that $(R^{-1})^{-1} = R$
3. Determine whether each function is a relation, is converse true give example to sport your answer.
4. Define transitive closure and warshall's algorithm.
5. Determine the Hass diagram of the relation A = { 1,2,3,4,5 } whose matrix is shown

$$M_R = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{array}$$

6. Prove that the following partial order set is a lattice.



Tutorial sheet 3

1. i). How many different four letter words can be formed (the words need not be meaningful) using the letters of the word MEDITERRANEAN such that the first letter is E and the last letter is R?

   ii). There are 6 boxes numbered 1, 2, ... 6. Each box is to be filled up either with a red or a green ball in such a way that at least 1 box contains a green ball and the boxes containing green balls are consecutively numbered. Find the total number of ways in which this can be done.

2. State and prove pigenhole principle. Also give an example.
3. Define a generating function. Use method of generating functions to solve

$$a_r - 7a_{r-1} + 10a_{r-2} = 0$$

, $a_0 = a_1 = 3$

4. Give an example each of a function which is

   i). injective but not surjective

   ii). Bijective

   iii). Surjective but not injective

5. Show that the function sinx is many one onto in the interval { 1, -1}.
6. Given that $F_n = 2n+1$, $G_n = 3n-1$, $n \in Z^+$

Tutorial Sheet 4

1. Define group semi group. Is every group a semigroup. Is converse true? Give an example.
2. What is a normal group? Give an example of a normal group.
3. Sate & prove Legrange's theorem.
4. Define a cyclic group. Prove that every subgroup of a cyclic group is cyclic.
5. Prove that integral domain is a field.
6. Consider binary operation * on I set of integer. Where * is defined as A*B= A+B+1. Show that this operation forms a group.
7. Define the following:
   (a) Ring
   (b) Ring with unity
   (c) Ring without zero deviser.
   (d) Integral domain
   (e) Field

PC-CS204A	Internet Technology and Management						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3**
Purpose	To provide the conceptual knowledge of Internet and methodologies used in web and secure internet communication and networking.						
Course Outcomes (CO)							
CO1	To study various fundamental concepts of Internetworking techniques with their characteristics.						
CO2	To study and understand the requirements for world-wide-web formats and techniques.						
CO3	To study the E-mail functioning and basics of HTML, XML and DHTML languages.						
CO4	To study the functioning of Servers and Privacy and Security related mechanisms.						

UNIT-1 : THE INTERNET

Introduction to networks and internet, history, Internet, Intranet and Extranet, Working of Internet, Internet Congestion, internet culture, business culture on internet. Collaborative computing and the internet. Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS, IP.v6.Modems, Speed and time continuum, communications software; internet tools.

UNIT-II : WORLD WIDW WEB

Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP, HTTP, Gophar Commands, TCP/IP. Introduction to Browser, Coast-to-coast surfing, hypertext markup language, Web page installation, Web page setup, Basics of HTML and formatting and hyperlink creation.Using FrontPage Express, Plug-ins.

UNIT-III : INTERNET PLATEFORM AND MAILING SYSTEMS

Introduction, advantages and disadvantages, User Ids, Pass words, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, MIME types, Newsgroups, mailing lists, chat rooms, secure-mails, SMTP, PICO, Pine, Library cards catalog, online ref. works.

Languages: Basic and advanced HTML, Basics of scripting languages – XML, DHTML, Java Script.

UNIT-IV : SERVERS

Introduction to Web Servers: PWS, IIS, Apache; Microsoft Personal Web Server. Accessing and using these servers.

Privacy and security topics: Introduction, Software Complexity, Attacks, security and privacy levels, security

policy, accessibility and risk analysis, Encryption schemes, Secure Web document, Digital Signatures, Firewalls, Intrusion detection systems

Suggested Books:

- Internet and World Wide Programming, Deitel,Deitel and Nieto, 2012, Pearson Education
- Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp, TMH- 2012
- Inline/Online: Fundamentals of The Internet And The World Wide Web, GREENLAW, TMH
- Complete idiots guide to java script,. Aron Weiss, QUE, 2013
- Network firewalls, Kironjeet syan -New Rider Pub.2014
- Networking Essentials – Firewall Media.Latest-2015
- www.secinf.com
- www.hackers.com
- Alfred Glkossbrenner-Internet 101 Computing MGH, 2013

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

Lesson Planning

Subject: Internet Technology and Management
Name of Institute: Seth Jai Parkash Mukand Lal Institute of Engineering & Technology Radaur
Department: CSE

Month	Class	Topic/Chapter Covered	Academic Activity	Test/ Assignment
January 19 L1	B.Tech 4th sem	Introduction to networks and internet,	Lecture	Assignment from 1st Unit Tute sheets (based on previous question papers and important topics)
L2	B.Tech 4th sem	history, Internet, Intranet & Extranet	Lecture	
L3	B.Tech 4th sem	Working of Internet, Internet Congestion, internet culture, business culture on internet	Lecture	
L4	B.Tech 4th sem	Collaborative computing & the internet	Lecture	
L5	B.Tech 4th sem	Modes of Connecting to Internet	Lecture	
L6	B.Tech 4th sem	Internet Service Providers, Internet address	Lecture	
L7	B.Tech 4th sem	standard address	Lecture	
L8	B.Tech 4th sem	domain name, DNS	Lecture	
L9	B.Tech 4th sem	IP.v6.Modems	Lecture	
L10	B.Tech 4th sem	Speed and time continuum	Lecture	
L11	B.Tech 4th sem	communications software, internet tools	Lecture	
L12	B.Tech 4th sem	Introduction, Miscellaneous Web Browser details	Lecture	Assignment from 2nd Unit Tute sheets (based on previous
L13	B.Tech 4th sem	Miscellaneous Web Browser details	Lecture	
L 14	B.Tech 4th sem	searching the www, Directories search engines	Lecture	
February 19 L 15	B.Tech 4th sem	meta search engines, search fundamentals	Lecture	
L 16	B.Tech 4th sem	search strategies, working of the search engines	Lecture	
L 17	B.Tech 4th sem	Telnet and FTP	Lecture	
L 18	B.Tech 4th sem	HTTP, Gophar Commands	Lecture	
L 19	B.Tech 4th sem	TCP/IP.	Lecture	
L20	B.Tech 4th sem	Introduction to Browser, Coast-to-coast surfing	Lecture	

L 21	B.Tech 4th sem	hypertext markup language	Lecture	question papers and important topics)
L 22	B.Tech 4th sem	Web page installation, Web page setup, Basics of HTML	Lecture	
L23	B.Tech 4th sem	formatting and hyperlink creation, Using FrontPage Express, Plug-ins.	Lecture	
L 24	B.Tech 4th sem	internet plateform and mailing systems Introduction, advantages and disadvantages,	Lecture	Assignment from 3rd Unit Tute sheets (based on previous question papers and important topics)
L 25	B.Tech 4th sem	User Ids, Pass words, e-mail addresses, message components, message composition	Lecture	
L26	B.Tech 4th sem	mailer features, E-mail inner workings, E-mail management	Lecture	
March 19 L 27	B.Tech 4th sem	MIME types	Lecture	
L 28	B.Tech 4th sem	Newsgroups, mailing lists	Lecture	
L29	B.Tech 4th sem	chat rooms, secure-mails , SMTP	Lecture	
L30 Add on's	B.Tech 4th sem	PICO	Lecture	
L 31	B.Tech 4th sem	PINE, Library cards catalog, online ref. works.	Lecture	
L 32	B.Tech 4th sem	Basic and advanced HTML	Lecture	
L33	B.Tech 4th sem	Basics of scripting languages – XML, DHTML	Lecture	
L34	B.Tech 4th sem	Java scripts basics	Lecture	
L35	B.Tech 4th sem	Introduction to Web Servers: PWS	Lecture	Assignment from 4th Unit Tute sheets (based on previous question papers and important topics)
L36	B.Tech 4th sem	Revision of SMTP	Lecture	
L37	B.Tech 4th sem	Revision of Topologies	Lecture	
L38	B.Tech 4th sem	Revision of HTML and their tags	Lecture	
L39	B.Tech 4th sem	Revision of MIME	Lecture	
L40	B.Tech 4th sem	Revision of Java Script	Lecture	
L41	B.Tech 4th sem	Revision of Servers	Lecture	
L42	B.Tech 4th sem	Revision of PICO and PINE	Lecture	

Paper: Internet Technology Management
PC-CS-204A

Time: 3 Hours
Max Marks: 75

Part A

Note: Attempt all questions. Each question carries 03 marks.

1. What is internet and intranet?
2. Define TELNET
3. Define newsgroups?
4. What is the different type of attacks?
5. What do you mean by ISP?

Part B

Note: Attempt all questions. Each question carries 05 marks.

1. Determine DNS?
2. Determine FTP?
3. Analyze advantages and disadvantages of email?
4. Determine firewalls?

Part C

Note: Attempt one question each section. Each question carries 10 marks.

Section-1

1. Determine the different modes of connecting to internet?
2. Explain IPV6

Section-2

1. Explain TCP/IP?
2. Explain directories and Meta search engines?

Section-3

1. Explain SMTP?
2. Explain Java script?

Section-4

1. Explain encryption schemes?
2. What do you mean by digital signature?

Roll No. .....
Printed Pages : 2

8493

BT-4 / M-17

INTERNET FUNDAMENTALS

Paper–CSE-204 N

Time allowed : 3 hours] *[Maximum marks : 75*

Note : Each question carries equal marks, attempt any five questions by selecting one question from each unit.

Unit–I

1. Explain the concepts of internet, intranet and extranet.

2. Write short note on following :
   (a) Domain name and DNS
   (b) Internet tools
   (c) Modems
   (d) Communication software
   (e) Internet Congestion.

Unit–II

3. (a) Explain the pros and cons of search engine.
   (b) Explain the basics of scripting language.

4. What are IP addresses ? Justify their significance; also discuss the structure of IP address.

Unit–III

5. (a) Create a HTML page that contains all basic tag.
   (b) Discuss the different components of common e-mail address format.

6. Write short note on following :
   (i) MIME types
   (ii) Newsgroups
   (iii) Secure e-mails

Unit–IV

7. What are web server ? Explain the function of following web server in detail :
   (a) Microsoft web server
   (b) Apache
   (c) Personal web server.

8. What is digital signature ? How it differ from in-person signature? Explain the mechanism of digital signature. How say its having secure feature to tradition security mechanism ?

Roll No. .....
Printed Pages : 2

34093

BT-4 / M-18

INTERNET FUNDAMENTAL

Paper–CSE–204N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Each question carry equal marks,* ***Question No. 1 is compulsory*** *and in addition to the* ***first*** *question attempt any* ***five*** *questions by selecting* ***one*** *question from each unit.*

Unit–I

1. Explain the steps involved in exchanging e-mail with the help of domain name systems. Give suitable example.

2. Write short note on following.

(a) Internet tools

(b) Modems

(c) Communication software

Unit–II

3. What do understand by FTP, HTTP and telnet? Explain the technique of FTP.

4. (a) What are frames? Justify their needs.

(b) Explain the HTML form and their creation.

Unit–III

5. What do you understand by web pages and email links and also explain their applications.

6. Explain various basics concepts of scripting language also explain in detail server side programming in javascript.

Unit–IV

7. What is web security, explain their security and privacy level. Also explain various type of attacks.

8. (a) What do understand by digital signatures? Explain their mechanism.

   (b) What is IDS? Explain various features of it.

BT-3/D-15

INTERNET FUNDAMENTALS

Paper :CSE-207-E

Time:3 hrs. M.M.: 100

Note: Attempt any FIVE questions in all, selecting at least one question from each unit. All questions carry equal marks.

UNIT-1

1. (a) Review a brief history of Internet. How it got started and where it is now?

(b) The internet is a medium and a market. Do you agree? Discuss. 10+10=20

2. (a) What infrastructure represents a typical internet service provider (ISP)?

(b) Discuss the different modes of connecting to internet.

(c) Differentiate between internet address and standard address. 7+7+6=20

Unit-II

3. (a) What is the difference between a web directory and a web search engine? Discuss different types of search engines.

(b) Write note on the following:

(i) Gophar commands.

(ii) Telnet and FTP. 10+10=20

4. (a) What do you understand by web page setup How you will install a web page?

(b) Discuss the following:

(i) Client (ii) Plug-ins 10+10=20

Unit-III

5. (a) List various tags of HTML, with its features which are used to make website attractive and interactive.

(b) Write the HTML syntax to create radio button and checkboxes. 10+10=20

6. (a) In electronic mail, what is MIME? Discuss the different type of MIME. If a sender sends an unformatted text what will be the MIME header?

(b) What is an e-mail? What are the various folders of e-mail storage? How would you create your own e-mail account? 10+10=20

Unit-IV

7. (a) What do you mean by web server? Discuss the usability and accessibility of available web servers.

(b) What are different security policies? Discuss. 10+10=20

8. (a) What do you mean by firewall? What is its purpose? Discuss the different types of firewall.

(b) What do you mean by Encryption? Explain the various encryption schemes. 10+10=20

PC-CS-206A	OPERATING SYSTEMS						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3**
Purpose	To familiarize the students with the basics of Operating Systems.						
Course Outcomes (CO)							
CO1	To understand the structure and functions of Operating system.						
CO2	To learn about processes, threads and scheduling algorithms.						
CO3	To understand the principle of concurrency.						
CO4	To understand the concept of deadlocks.						
CO5	To learn various memory management schemes.						
CO6	To study I/O management and file systems.						
CO7	To study the concept of protection and security.						

UNIT 1

Introduction: Introduction to OS. Operating system functions, Different types of O.S.: batch process, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

UNIT II

CPU scheduling: scheduling criteria, preemptive and non-preemptive scheduling, scheduling algorithms, algorithm evaluation, multi-processor scheduling.

Threads: overview, benefits of threads, user and kernel threads.

Process Management: Concept of processes, process states, process control, co-operating processes, inter-process communication.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, Classical problems of synchronization, semaphores.

UNIT III

Deadlocks: Concept of deadlock, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Memory Management: background, logical vs. physical address space, contiguous memory allocation, paging, segmentation, segmentation with paging. Concept of fragmentation.

Virtual Memory: background, demand paging, concept of page replacement, page replacement algorithms , allocation of frames, thrashing.

UNIT IV

File Systems: file concept, file organization and access methods, allocation methods, directory structure, free-space management

I/O Management: I/O hardware, polling, interrupts, DMA, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation)

Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk Performance parameters

Protection and Security:

Goals of protection and security, security attacks, authentication, program threats, system threats, threat monitoring.

Case studies: UNIX file system, Windows file system

Suggested Books:

- Operating System Concepts", Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Wiley
- Operating systems: a concept based approach", Dhananjay M. Dhamdhere, McGraw Hill .
- Operating Systems : Internals and Design Principles, William Stallings, Pearson
- Operating Systems Design and Implementation" ,(Prentice Hall Software Series) Andrew S Tanenbaum and Albert S Woodhull.
- Taub and Schilling, Principles of Communication Systems, TMH.
- Mithal G K, Radio Engineering, Khanna Pub.

• Sirnon Haykin, Communication Systems, John Wiley.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

LECTURE PLAN (Operating System)

Lecture	Topic
L1	Introduction to OS. Operating system functions
L2	Different types of O.S.: batch process, multi-programmed, time-sharing, real-time, distributed
L3	Parallel O.S.
L4	System Structure: Computer system operation, I/O structure
L5	Storage structure, storage hierarchy
L6	Different types of protections
L7	Operating system structure (simple, layered, virtual machine)
L8	O/S services, system calls.
L9	CPU scheduling: scheduling criteria
L10	Preemptive & non-preemptive scheduling
L11	Scheduling algorithms,
L12	Algorithm evaluation, multi-processor scheduling.
L13	Threads: overview, benefits of threads
L14	User and kernel threads.
L15	Process Management: Concept of processes
L16	Process states, process control
L17	Co-operating processes, inter-process communication.
L18	Process Synchronization: background, critical section problem
L19	Critical region, synchronization hardware
L20	Classical problems of synchronization, semaphores
L21	Deadlocks: Concept of deadlock, deadlock characterization
L22	Deadlock prevention, deadlock avoidance
L23	Deadlock detection, recovery from deadlock
L24	Memory Management: background, logical vs. physical address space
L25	Contiguous memory allocation
L26	Paging, segmentation
L27	Segmentation with paging. Concept of fragmentation
L28	Virtual Memory: background
L29	Demand paging, concept of page replacement
L30	Page replacement algorithms

L31	Allocation of frames, thrashing.
L32	File Systems: file concept, file organization and access methods
L33	Allocation methods, directory structure
L34	Free-space management
L35	I/O Management: I/O hardware, polling, interrupts
L36	DMA, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation)L37 Disk Management**:** disk structure
L38	Disk scheduling (FCFS, SSTF, SCAN,C-SCAN)
L39	disk reliability, disk Performance parameters
L40	Protection & Security: Goals of protection and security
L41	Security attacks, authentication
L42	Program threats, system threats, threat monitoring.
L43	Case studies: UNIX file system, Windows file system

TUTORIAL SHEET-1

Q1. Explain the definition and types of operating systems.

Q2. Explain Batch system, multi-programming, timesharing.

Q3. What are different types of protections.

Q4. Explain operating system structure?

Q5. What are the various O.S. services?

TUTORIAL SHEET-2

Q1. Explain CPU scheduling criteria.

Q2. Explain scheduling algorithms?

Q3.Explain Multi-processor scheduling.

Q4. Explain critical section problem.

Q5. Explain synchronization hardware.

TUTORIAL SHEET-3

Q1. Explain deadlock system model?

Q2. Explain Deadlock prevention, avoidance and detection?

Q3. Explain recovery from deadlock?

Q4.What do you mean by memory management. Also explain Logical an physical address space?

Q5. Explain swapping and contiguous allocation?

TUTORIAL SHEET-4

Q1. Explain file systems and secondary storage structure.

Q2. What do you mean by page replacement? Explain its algorithms.

Q3. Explain file concept and access methods.

Q4. Explain disk scheduling methods?

TUTORIAL SHEET-5

Q1. Explain disk management and structure?

Q2. What is the cause of thrashing? How does the system detect thrashing?

Q3. What is throughput, turnaround time, waiting and response time.

Q4. Explain virtual memory and demand paging?

Q5. Explain critical regions and monitors?

Roll No. .....
Printed Pages : 2

34096

BT-4 / M-18

OPERATING SYSTEM

Paper–CSE–210 N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Attempt **five** questions in all by selecting at least **one** question from each unit. All questions carry equal marks.*

Unit–I

1. (a) How can you classify operating systems? Explain in detail. 7.5

   (b) Explain various modes of operating systems along with its architecture. 7.5

2. (a) Discuss the storage structure and hierarchy in a computer system. 7.5

   (b) Comment on the need of protection of a system. How it can be achieved? Explain. 7.5

Unit–II

3. (a) What is inter-process communication? How synchronization can be achieved with the help of Peterson's algorithm? 7.5

   (b) What is a semaphore? How semaphores can be implemented? Discuss various types of semaphores along with their usage. 7.5

4. Comment on the need of CPU-Scheduling. Explain various CPU scheduling algorithms using suitable examples. 15

Unit–III

5. (a) What is segmentation? Discuss segmentation hardware with the help of diagram. What type of fragmentation can be caused by segmentation? 7.5

   (b) Write and explain Banker's algorithm with the help of an appropriate example. 7.5

6. (a) What is demand paging? Explain its advantages and disadvantages. Explain with suitable example. 7.5

   (b) How a system can recover from a deadlock situation? Explain. 7.5

Unit–IV

7. (a) Explain various directory structures used by operating systems in detail. Also give advantages and disadvantages of each of them. 7.5

   (b) Find the total head movement when head starts at cylinder 50 in case of (i) FCFS (ii) SSTF (iii) SCAN (iv) C-SCAN (v) LOOK (vi) C-LOOK Disk queue is: 90, 170, 30, 55, 68, 98, and 89. 7.5

8. (a) Explain various file allocation method. 7.5

   (b) Explain various protection issues and protection measures in detail. 7.5

Roll No. .....
Printed Pages : 3

8496

BT-4/M-17

OPERATING SYSTEM

Paper–CSE-210-N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- Attempt five questions in all, selecting at least one question from each unit. All questions carry equal marks.

Unit-I

1. (a) What is an operating system? Explain the need of operating system. 7.5

   (b) What do you mean by system call and system program? Explain various types of system calls and system programs. 7.5

2. (a) What is a process? Describe process control block in detail. 7.5

   (b) Write short notes on:

   (i) Multiprogramming

   (ii) Multitasking

   (iii) Multithreading. 7.5

Unit-II

3. Describe any two classical problem of synchronization along with their solution in detail. 15

4. (a) What do you mean by CPU scheduling? What is scheduling criteria? Discuss in detail. 7.5

   (b) Compare various scheduling algorithm on different counts. 7.5

Unit-III

5. Describe the various necessary conditions for a deadlock to occur. Explain various ways to handle a deadlock in detail. 15

6. (a) Consider the following page-reference string:

1, 2, 3,4, 2, 1, 5, 6, 2, 1, 2, 3, 7,6, 3, 2, 1, 2, 3, 6

How many page faults would occur for the following replacement algorithms, assuming three and four frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.

(i) LRU replacement

(ii) FIFO replacement

(iii) Optimal replacement. 7.5

(b) What is segmentation? Discuss segmentation hardware with the help of diagram. What type of fragmentation can be caused by segmentation? 7.5

Unit-IV

7. (a) Consider a system that supports the strategies of contiguous, linked, and indexed allocation. What criteria should be used in deciding which strategy is best utilized for a particular file? 7.5

(b) Explain various attributes and operations of a file. Also discuss the protection mechanism in a file system with specific reference to UNIX. 7.5

8. Suppose a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53, and the previous request was at cylinder 12. The queue of pending requests, in FIFO order, is 98,183,37,122,14,124,65,67

Starting from the current head position, what is the total distance (in cylinder) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?

(i) FCFS (ii) SSTF (iii) SCAN (iv) LOOK

(v) C-SCAN (vi) C-LOOK. 15

Seth Jai Parkash Mukand Lal Institute of Engineering & Technology (JMIT), Radaur
Department of Computer Sci. & Engineering, (B.Tech 4th Semester)
Operating System (PC-CS-206)

Max Marks: 75 **Max Time: 3:00 Hours**

Note: - All questions in Part A and Part B are compulsory. Part C contains eight questions of ten marks each. Total four questions are to be attempted, selecting at least one question from each unit.

PART-A (15 Marks)

Q.No.-1 Answer the following questions

5x3=15

SN	Question (All questions Carry equal marks)
i.	Define System Call?
ii.	What is belady's anomaly?
iii.	Differentiate between local and global page replacement
iv.	What do you mean by threat monitoring?
v.	Explain the difference between non-preemptive and preemptive scheduling?

PART-B (20 Marks)

4x5=20

	UNIT-1
2	Difference between hard and soft real time Operating systems?
	UNIT-II
3	Explain Inter process communication with suitable example?
	UNIT-III
4	What do you mean by page-faults? When does a page –fault occur? Describe the action taken by OS when a page fault occurs?
	UNIT-IV
5	Explain Access control lists as a protection mechanism?

PART-C (40 Marks)

4 x 10 =40

	UNIT-1
1	Define the concept of multiprogramming and time sharing system. Write at least three advantages of time sharing systems?
2	What do you mean by Operating-System Structure? Explain Layered Architecture with benefits and limitations?
	UNIT-II
3	Explain producer consumer problem using semaphore?
4	**PROCESS ARRIVE TIME CPU BURST**

	P1 0 12 P2 1 5 P3 2 9 P4 3 7 Draw gannt chart and find out averge waiting time of all processes under fcfs, SJF (preemptive & non preemptive) and RR
	UNIT-III
5	consider the following snapshot of a system: **PROCESS** **ALLOCATION** **MAX** **AVAILABLE** A B C D A B C D A B C D P0 0 0 1 2 0 0 1 2 1 5 2 0 P1 1 0 0 0 1 7 5 0 P2 1 3 5 4 2 3 5 6 P3 0 6 3 2 0 6 5 2 P4 0 0 1 4 0 6 5 6 Answer the following question using the banker's algorithm; a. what will be the content of matrix need ? b. draw the safe sequence ? c. if the request from p1 arrives for (0,4,2,0),can the request be granted immediately ?
6	What do you mean by page replacement? Explain various page replacement algorithms with example of each?
	UNIT-IV
7	Explain file system implementation in Unix?
8	Explain SCAN and CSAN using suitable example?

PC-CS208A	Design and Analysis of Algorithms						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3 Hrs.**
Purpose	To introduce advanced data structures and algorithms concepts involving their implementation for solving complex applications.						
Course Outcomes (CO)							
CO1	To introduce the basic concepts of Data Structures and their analysis.						
CO2	To study the concept of Dynamic Programming and various advanced Data Structures.						
CO3	To introduce various Graph algorithms and concepts of Computational complexities.						
CO4	To study various Flow and Sorting Networks						

Unit 1: Introduction

Review:- Elementary Data Structures, Algorithms and its complexity(Time and Space), Analysing Algorithms, Asymptotic Notations, Priority Queue, Quick Sort.

Recurrence relation:- Methods for solving recurrence(Substitution , Recursion tree, Master theorem), Strassen multiplication.

Unit 2: Advanced Design and analysis Techniques

Dynamic programming:- Elements, Matrix-chain multiplication, longest common subsequence,
Greedy algorithms:- Elements , Activity- Selection problem, Huffman codes, Task scheduling problem, Travelling Salesman Problem.

Advanced data Structures:- Binomial heaps, Fibonacci heaps, Splay Trees, Red-Black Trees.

Unit 3: Graph Algorithms

Review of graph algorithms:-Traversal Methods(Depth first and Breadth first search),Topological sort, Strongly connected components, Minimum spanning trees- Kruskal and Prims, Single source shortest paths, Relaxation, Dijkstras Algorithm, Bellman- Ford algorithm, Single source shortest paths for directed acyclic graphs, All pairs shortest paths- shortest paths and matrix multiplication, Floyd-Warshall algorithm.

Computational Complexity:-Basic Concepts, Polynomial Vs Non-Polynomial Complexity, NP- hard and NP-complete classes.

Unit 4: Network and Sorting Algorithms

Flow and Sorting Networks Flow networks, Ford- Fulkerson method, Maximum Bipartite matching, Sorting Networks, Comparison network, The zero- One principle, Bitonic sorting network, Merging networks

Suggested Books :

- Corman, Leiserson and Rivest : Introduction to Algorithms, 2/e, PHI
- Das Gupta :Algorithms, TMH.
- Horowitz, Ellis and Sahni, Sartaj: Fundamentals of Computer Algorithms. Galgotia Publications
- Aho, Hopcroft and Ullman: The Design and Analyses of Computer Algorithms. Addison Wesley.
- R.B.Patel: Expert Data Structures with C, Khanna Publications , Delhi, India, 2nd Edition 2004, ISBN 81-87325-07-0.
- R.B.Patel and M.M.S Rauthan: Expert Data Structures with C++, Khana Publications, Delhi , India, 2nd Edition 2004,ISBN 87522-03-8

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

Lecture Plan (DAA)

L1: Elementary Data Structures,
L2: Algorithms & its complexity (Time & Space),
L3: Analysing Algorithms, Asymptotic Notations,
L4: Priority Queue,
L5: Quick Sort
L6: Merge sort.
L7: Methods for solving recurrence (Substitution, Recursion tree, Master theorem),
L8: Strassen multiplication.
L9: Binomial heaps.
L10: Fibonacci heaps,
L11: Splay Trees.
L12: Red-Black Trees.
L13: Dynamic programming: Elements,
L14: Matrix-chain multiplication, longest common subsequence,
L15: Greedy algorithms: Elements,
L16: Activity- Selection problem,
L17: Huffman codes,
L18: Task scheduling problem,
L19: Travelling Salesman Problem.
L20: Backtracking algorithms: Graph colouring,
L21: N-Queen problem,
L22: Hamiltonian path and circuit.
L23: Review of graph algorithms:
L24: Traversal Methods(Depth first & Breadth first search).
L25: Topological sort, strongly connected components,
L26: Minimum spanning trees- Kruskal's and Prim's Algorithm
L27: Single source shortest paths, Relaxation,
L28: Dijkstra's Algorithm,
L29: Bellman- Ford algorithm,
L30: Single source shortest paths for directed acyclic graphs,
L31: Floyd-Warshall algorithm.
L32:Computational Complexity: Basic Concepts,
L33: Polynomial vs Non-Polynomial Complexity
L34: NP- hard & NP-complete classes
L35: NP- hard & NP-complete classes
L36: Flow and Sorting Networks,
L37: Flow networks,
L38: Ford- Fulkerson method,
L39: Maximum bipartite matching, Sorting Networks,
L40: Comparison network, Zero- one principle,
L41: Bitonic sorting network,
L42: merging network

TUTORIAL SHEET

UNIT-I

1: what is Elementary Data Structures, Algorithms & its complexity(Time & Space)
2: Priority Queue, Quick Sort
3: Explain Merge sort.
4: Methods for solving recurrence
5: Binomial heaps, Fibonacci heaps, Red-Black Trees.

UNIT-II

1: what is Matrix-chain multiplication, longest common subsequence,
2: Greedy algorithms:- Elements , Activity- Selection problem
3: Huffman codes, Task scheduling problem.
4: N-Queen problem
5: Hamiltonian path and circuit.

UNIT-III

1: Review of graph algorithms:-Traversal Methods(Depth first & Breadth first search)
2: Topological sort, Strongly connected components
3: Minimum spanning trees- Kruskal's and Prim's Algorithm
4: Dijkstra's Algorithm, Bellman- Ford algorithm
5: Single source shortest paths for directed acyclic graphs
6: Floyd-Warshall algorithm.

UNIT-IV

1: Basic Concepts, Polynomial vs Non-Polynomial Complexity
2: NP- hard & NP-complete classes.
3: Flow and Sorting Networks
4: Maximum bipartite matching, Sorting Networks, Comparison network
5: Zero- one principle, Bionic sorting network, merging network

Roll No. ..... Total Pages : 03

BT-5/D-18 35115

DESIGN AND ANALYSIS OF ALGORITHMS
CSE-305N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) What is a Asymptotic Analysis ? Explain the steps used in analyzing an algorithn using asymptotic notations for best, average and worst case.

   (b) What is Strassen's matrix multiplication ? Explain.

2. What is Quick Sort ? How is it different from merge sort ? Justify your answer.

Unit II

3. (a) What is Longest common subsequence problem ? How to solve it using dynamic programming approach ? Explain for the following two sequences : X = <A, B, D, B, C, A, D>, Y = <B, D, A, D, C, A>.

(b) Explain Traveling salesman problem and its solution using greedy approach.

4. What do you mean by N-Queen problem ? How it can be solved using multiple techniques ? Explain.

Unit III

5. (a) What is shortest path of a graph ? Explain the all pair shortest path algorithm of finding the shortest path using suitable examples.

(b) Differentiate between Dijkstra and Bellman-Ford algorithms.

6. (a) What do you understand by minimum spanning tree of a graph ? Explain using suitable example.

(b) What is directed acyclic graphs ? How to find the shortest path in those graphs ? Explain.

Unit IV

7. Write detailed notes on the following :

(a) Complexity classes

(b) Zero-one principle.

8. (a) What is bitonic sorting networks ? Differentiate between comparison network and bitonic sorting networks.

(b) Explain Maximum bipartite matching problem using suitable examples.

HTM-901A	Universal Human Values II: Understanding Harmony						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3 Hours**
Purpose	Purpose and motivation for the course, recapitulation from Universal Human Values-I						
Course Outcomes (CO)							
CO 1	Development of a holistic perspective based on self-exploration about themselves (human being),family, society and nature/existence.						
CO 2	Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.						
CO 3	Strengthening of self-reflection.						
CO 4	Development of commitment and courage to act.						

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

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 ofaspirations 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 variouslevels.

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 arbitrarinessin choice based on liking-disliking

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

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

Include practice sessions to discuss the role others have played in making material goods available tome. 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

13. 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

14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution,Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- fromfamily 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 inrelationships. Discuss with scenarios. Elicit examples from students' lives

Module 4: Understanding Harmony in the Nature and Existence - Whole existence asCoexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

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

Module 5: Implications of the above Holistic Understanding of Harmony on ProfessionalEthics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. 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.
26. Case studies of typical holistic technologies, management models and production systems
27. 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
28. 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 CKumarappa
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

Lecture hours are to be used for lecture/practice sessions.

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

Practice hours are to be used for practice sessions.

While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elementsto 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, 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.

Practice experiments 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 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 onbasic 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 deemedessential.

ASSESSMENT:

This is a compulsory 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: 5 marks

Self-assessment: 5 marks

Assessment by peers: 5 marks

Socially relevant project/Group Activities/Assignments: 10 marks

Semester End Examination: 75 marks

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

HTM-901A	Universal Human Values II: Understanding Harmony						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3.0**	**75**	**25**	**100**	**3 Hours**
Purpose	Purpose and motivation for the course, recapitulation from Universal Human Values-I						
Course Outcomes (CO)							
CO 1	To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.						
CO 2	To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence . such a holistic perspective forms the basis of universal human values and movement towards value based living in a natural way.						
CO 3	To distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Coexistence of Self and Body.						
CO 4	To understand the harmony in nature and existence, and work out their mutually fulfilling participation in nature.						
CO5	To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.						
CO6	To highlight plausible implications of such a holistic understanding in terms of ethical human conduct ,trustful and mutually fulfilling human behavior and mutually enriching interaction with nature.						

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!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of 'I' and harmony in 'I'

11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

12. 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

13. 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

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values

in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. 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

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human beings 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

22. Natural acceptance of human values

23. Definitiveness of Ethical Human Conduct

24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

25. 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.

26. Case studies of typical holistic technologies, management models and production systems

27. 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

28. 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.

LESSON PLAN

Subject Name: - Universal Human Values II: Understanding Harmony

Subject Code: - HTM-901A **Year: - 2nd** **Semester: - 4th**

Lecture No	Unit No	Topic
1	I	**Module-1: Course Introduction: Need,** **Basic Guidelines, Content and Process for Value Education**
2		Purpose and motivation for the course, recapitulation from Universal Human Values-I
3		Self-Exploration: Meaning, content and process. Natural Acceptance and Experiential Validation as the process for self-exploration
4		Continuous Happiness and Prosperity- A look at basic Human Aspirations
5		Right understanding, Relationship and Physical Facility: the basic requirements for fulfilment of aspirations of every human being with their correct priority
6		Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
7		Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
8		Practice sessions to discuss natural acceptance in human being
9		Practice sessions to discuss natural acceptance in human being
10	II	**Module 2: Understanding Harmony in the Human Being - Harmony in Myself!** **Understanding human being as a co-** **existence of the sentient 'I' and the material Body**
11		Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
12		Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

13		Understanding the characteristics and activities of 'I' and harmony in 'I'
14		Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
15		Programs to ensure Sanyam and Health.
16		Practice sessions to discuss the role others have played in making material goods available to me
17		Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease
18	III	**Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** **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**
19		Understanding the meaning of Trust; Difference between intention and competence
20		Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
21		Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
22		Visualizing a universal harmonious order in society- Undivided Society. Universal Order - from family to world family.
23		Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc.
24		Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

25	IV	**Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** **Understanding the harmony in the Nature**
26		Interconnectedness and mutual fulfilment among the four orders of nature - recyclability and self - regulation in nature.
27		Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
28		Holistic perception of harmony at all levels of existence
29		Practice sessions to discuss human being as cause of imbalance in nature, pollution, depletion of resources and role of technology etc
30	V	**Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics - Natural acceptance of human values**
31		Definitiveness of Ethical Human Conduct
32		Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
33		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.
34		Case studies of typical holistic technologies, management models and production systems
35		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
36		Sum up of program
37		Practice Exercises and Case Studies to discuss the conduct as an engineer or scientist etc

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Tutorial No 1

Subject: Universal Human Values **Sub Code: HTM-901A**
Semester: 4th **Section: C**

Q1. What do you mean by values or human values?**CO1**

Q2. What are the basic guidelines for value education? **CO1**

Q3.What is the need for value education? **CO1**

Q4. Values and skill complement each other. Elaborate.**CO1**

Q5.Explain how production skills and human values are complementary. Give two examples. **CO2**

Tutorial No 2

Subject: Universal Human Values **Sub Code: HTM-901A**
Semester: 4th **Section: C**

Q1.What do you mean by Sukh and Suvidha?**CO2**

Q2.The needs of the body are quantitative. Illustrate.**CO2**

Q3.Distinguish between the needs of the Self and the needs of the Body. **CO2**

Q4."Human being is more than just the body" – Explain.**CO3**

Q5'Human being is co-existence of the Self and the Body' – elaborate on this statement.**CO3**

Tutorial No 3

Subject: Universal Human Values **Sub Code: HTM-901A**
Semester: 4th **Section: C**

Q1Define love.**CO3**

Q2.What is meaning of justice in human relationships? How does it follow from family to world family?**CO4**

Q3.How do we differentiate in relationships on the basis of body, physical facilities, or beliefs? What problems do we face because of such differentiation?**CO3**

Q4. Explain the problems faced due to differentiation in relationship?**CO4**

Q5.Difference between respect and differentiation. **CO4**

Tutorial No 4

Subject: Universal Human Values **Sub Code: HTM-901A**
Semester: 4th **Section: C**

Q1.Define harmony in nature. OR Explain the harmony in nature. **CO4**
Q2. What do you mean by co-existence?**CO4**
Q3. What do you mean by 'innateness'? What is the innateness in the four orders? **CO5**
Q4. What is the svabhava (natural characteristic) of a unit? Elaborate on the svabhava of a human order.**CO5**
Q5. What are the four orders of nature? Briefly explain them.**CO5**

Tutorial No 5

Subject: Universal Human Values **Sub Code:HTM-901A**
Semester: 4th **Section: C**

Q1.What are the values in interaction of human beings with the material things? Give one example of each**CO5**

Q2.What do you understand by definitiveness of ethical human conduct? Why is this definitiveness desirable?**CO6**

Q3. Comment on Profession – in the light of comprehensive human goal.**CO6**

Q4. What do you mean by professional ethics?**CO6**

Q5.What do you mean by competence in professional ethics? Elaborate with examples.**CO6**

Roll No. ..... Total Pages : 2

BT-3/D-21 **43191**

UNDERSTANDING HARMONY

Paper : HTM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions by selecting at least *one* question from each unit.

UNIT–I

1. What do you mean by Value Education? Why there is a need of value education? What are the basic guidelines for value education? 15

2. (a) Self Exploration is a process of dialogue between 'what you are' and 'what you really want to be'. Explain and illustrate. 7.5

   (b) Explain the role of Education-Sanskar in holistic development. 7.5

UNIT–II

3. (a) Explain the concept of Imagination. Describe the possible sources of motivation for Imagination. 7.5

   (b) What do you mean by Self regulation? What are the programs to ensure proper functioning of body? Explain. 7.5

4. What is the responsibility of the self towards the body? How is it fulfilled? 'The human body is a self organized unit'. How? 15

UNIT–III

5. What do you understand by Respect? How do we disrespect others due to lack of right understanding of this feeling? Explain the problems faced due to differentiation in relationship. 15

6. "When we are assured of the intention of the other and find that the competence is lacking, we become a help to the other. When we doubt the intention of the other, we get into opposition." Explain. 15

UNIT–IV

7. Describe the various dimensions of human order required for the fulfillment of the human goal. 15

8. (a) Describe the four orders in nature. Critically examine the attitude of humans towards the other three orders of nature. 7.5

   (b) Write a short note on 'nature (units) submerged in space'. 7.5

Roll No. .....

Total Page : 1

BT-5/D-21

45258

UNIVERSAL HUMAN VALUES II : UNDERSTANDING HARMONY

Paper–HTM-901A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. What do you mean by Value Education ? Why there is a need of Value Education ? What are the basic guidelines for Value Education ? 15

2. What are the basic requirements to fulfill human aspirations ? Explain. 15

UNIT–II

3. 'Human being is co-existence of the Self and the Body'–elaborate on this statement. 15

4. What is the responsibility of th self towards the body ? How is it fulfilled ? 'The Human body is a self organized unit'. How ? 15

UNIT–III

5. What are the foundational values of relationship ? How can they be used to ensure strong relationship ? 15

6. "When we are assured of the intention of the other and find that the competence is lacking, we become a help to the other. When we doubt the intention of the other, we get into opposition." Explain. 15

UNIT–IV

7. Describe the various dimensions of human order required for the fulfillment of the Human goal. 15

8. What are the four orders in Nature ? How does each other participate in the harmony in the nature ? Explain with suitable examples. 15

Total Pages : 2

Roll .....

44215

BT-4/M-22

4073

UNIVERSAL HUMAN VALUES II: UNDERSTANDING HARMONY

Paper–HTM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions by selecting at least *one* question from each unit.

UNIT–I

1. What do you mean by Natural acceptance? Explain the process of Self Exploration with the help of diagram. 15

2. What do you mean by Value Education? What should be the content of value education to make it complete? What are the basic guidelines for value education? 15

UNIT–II

3. (a) Values & Skill complement each other. Elaborate. 7½

   (b) What do you understand by Self regulation? Differentiate between the needs of self and the body. 7½

4. 'Human being is co-existence of the Self and the Body'- elaborate on this statement. 15

UNIT–III

5. How does 'Justice' lead to mutual happiness? Describe the dimensions (systems) of Human Order. Explain the problems faced due to differentiation in relationship. 15

6. In our behavior, we generally observe our intention and others' lack of competence. Does it lead to mutual happiness? What is the alternative? Explain with the help of an example. 15

UNIT–IV

7. Write a brief note on the concept of the holistic perception of harmony in existence. 15

8. There is interconnectedness and mutual fulfillment among the four orders in nature. With right understanding only, human being will be self organized, in harmony within and participate in the harmony in the large order. Explain. 15

Roll No. 122042

Total Pages : 2

45258

BT-5/D-22

UNIVERSAL HUMAN VALUES–II : UNDERSTANDING HARMONY

Paper–HTM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, by selecting at least one question from each unit.

1. (a) 'The prime need of value education is to understand human aspirations, to discover what is truly valuable (human value) in life'. Explain and illustrate. (7.5)

(b) Explain the role of Education-Sanskar in holistic development. (7.5)

2. What do you mean by Natural acceptance? Explain the process of Self Exploration with the help of diagram. (15)

UNIT-II

3. 'The needs of the Self and the Body are of two different types, so they have to be filled separately. A gross misunderstanding is to assume the two to be the same, and this leads to the feeling of deprivation and exploitation'. Explain. (15)

4. 'Human being is co-existence of the Self and the Body'– elaborate on this statement. (15)

UNIT-III

5. What do you understand by Respect? How do we disrespect others due to lack of right understanding of this feeling? Explain the problems faced due to differentiation in relationship. (15)

6. "When we are assured of the intention of the other and find that the competence is lacking, we become a help to the other. When we doubt the intention of the other, we get into opposition." Explain. (15)

UNIT-IV

7. There is interconnectedness and mutual fulfillment among the four orders in nature. With right understanding only, human being will be self organized, in harmony within and participate in the harmony in the large order. Explain. (15)

8. (a) How does 'Justice' leads to mutual happiness. Explain the natural process of a child in an environment of relationship and in an environment of domination. (7.5)

   (b) Write a short note on 'nature (units) submerged in space'. (7.5)

PC-CS210AL	Internet Technology and Management Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2.0**	**40**	**60**	**100**	**3 Hour**
Purpose	Learn the internet and design different web pages using HTML .						
Course Outcomes (CO)							
CO1	Understanding different PC software and their applications.						
CO2	To be able to learn HTML.						
CO3	To be able to write Web pages using HTML.						
CO4	To be able to install modems and understand the e-mail systems.						

PC Software: Application of basics of MS Word 2000, MS Excel 2000, MS Power Point 2000, MS Access 2000, HTML

1. To prepare the Your Bio Data using MS Word
2. To prepare the list of marks obtained by students in different subjects and show with the help of chart/graph the average, min and max marks in each subject.
3. Prepare a presentation explaining the facilities/infrastructure available in your college/institute.
4. Design Web pages containing information of the Deptt.

HTML Lists:

1. Create a new document that takes the format of a business letter. Combine <P> and <BR> tags to properly separate the different parts of the documents. Such as the address, greeting, content and signature. What works best for each?
2. Create a document that uses multiple <BR> and <P> tags, and put returns between <PRE> tags to add blank lines to your document see if your browser senders them differently.
3. Create a document using the <PRE>tags to work as an invoice or bill of sale, complete with aligned dollar values and a total. Remember not to use the Tab key, and avoid using emphasis tags like <B> or <EM> within your list.
4. Create a seven-item ordered list using Roman numerals. After the fifth item, increase the next list value by 5.
5. Beginning with an ordered list, create a list that nests both an unordered list and a definition list.
6. Use the ALIGN attribute of an <IMG> tags to align another image to the top of the first image.. play with this feature, aligning images to TOP, MIDDLE and BOTTOM.
7. Create a 'table of contents' style page (using regular and section links) that loads a different document for each chapter or section of the document.

Internet:

1. Instilling internet and external modems, NIC and assign IP address.
2. Study of E-mail system.
3. Create your own mail-id in yahoo and indiatimes.com.
4. Add names (mail-id's) in your address book, compose and search an element.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

PC-CS212AL	Operating Systems Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2.0**	**40**	**60**	**100**	**3**
Purpose	To familiarize the students with the basics of Operating Systems.						
Course Outcomes (CO)							
CO1	To understand the CPU scheduling.						
CO2	To learn about memory management.						
CO3	To understand system calls.						
CO4	To understand the concept of file operations.						
CO5	To learn various classical problems.						

1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
2. Program for paging techniques of memory management.
3. Program for page replacement algorithms
4. Simulation of Bankers Deadlock Avoidance and Prevention algorithms.
5. Program for Implementation of System Calls.
6. Program for File Permissions
7. Program for File Operations.
8. Program for File Copy and Move.
9. Program for Dining Philosophers Problem.
10. Program For Producer – Consumer Problem concept.
11. Program for disk scheduling algorithms.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

PC-CS214AL	Design and Analysis of algorithms Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2.0**	**40**	**60**	**100**	**3**
Purpose	The student should be made to Learn the algorithm analysis techniques, become familiar with the different algorithm design techniques and Understand the limitations of Algorithm power.						
Course Outcomes (CO)							
CO1	The student should be able to Design algorithms for various computing problems.						
CO2	The student should be able to Analyze the time and space complexity of algorithms.						
CO3	The student should be able to Critically analyze the different algorithm design techniques for a given problem.						
CO4	The student should be able to Modify existing algorithms to improve efficiency.						

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the lIst to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Using Open, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph.
   b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kristal's algorithm.
7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
   b. Check whether a given graph is connected or not using DFS method.
8. Find a subset of a given set S = {sl,s2,.... ,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

9. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
10. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.
12. Implement N Queen's problem using Back Tracking.
13. Use divides and conquers method to recursively implement Binary Search

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.