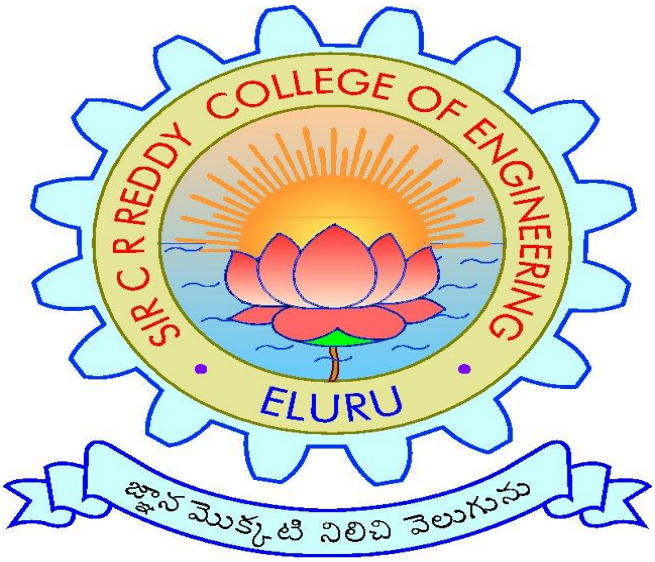
SIR C.R.REDDY COLLEGE OF ENGINEERING, ELURU

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT



SUBJECT: OPERATING SYSTEM

CLASS: II/IV B.Tech., I SEMESTER, A.Y.2023-24

INSTRUCTOR: Smt. B.Lalitha Bhavani

Course Handout Index

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COLLEGE VISION

To emerge as a premier institution in the field of technical education and research in the state and as a home for holistic development of the students and contribute to the advancement of society and the region.

COLLEGE MISSION

To provide high quality technical education through a creative balance of academic and industry oriented learning; to create an inspiring environment of scholarship and research; to instill high levels of academic and professional discipline; and to establish standards that inculcate ethical and moral values that contribute to growth in career and development of society in general.

VISION OF THE DEPARTMENT

To be a premier Department in the region in the field of Information Technology through academic excellence and research that enable graduates to meet the challenges of industry and society

MISSION OF THE DEPARTMENT

- To Provide dynamic teaching-learning environment to make the students industry ready and advancement in career;
- To inculcate professional and leadership quality for better employability and entrepreneurship;
- To make high quality professional with moral and ethical values suitable for industry and society

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Solve real world problems through effective professional skills in Information Technology industry and academic research.

PEO2: Analyze and develop applications in Information Technology domain and adapt to changing technology trends with continuous learning.

PEO3: Practice the profession in society with ethical and moral values.

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in society and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the

engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Conceptual Skills: Apply core information technology of systems, architecture, information management, programming, networking for development of current technical concepts.

PSO2: Technical Skills: Design and develop software by adapting emerging technologies for the need of IT industry.

Academic Calendar

SIR C R REDDY COLLEGE OF ENGINEERING

ELURU-534007, WEST GODAVARI DIST, ANDHRA PRADESH, INDIA
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
Telephone No: 08812-230840, 230565, Fax: 08812-224193
Website: www.sircrrengg.ac.in

IQAC

DEPARTMENT OF INFORMATION TECHNOLOGY
II/IV ACADEMIC CALENDAR 2023 – 2024

EVENTS / ACTIVITIES	I- SEMESTER	II- SEMESTER
Registration of Credits/Electives	15-07-2023 to 5-07-2023	10-12-2023 To 24-12-2023
Commencement of classes	7-08-2023	27-12-2023
Class work – 1st Phase of Instruction (From… To…)	07-08-2023 To 30-09-2023	27-12-2023 To 17-02-2024
Class Review Committee Meeting-I/Parent-Teachers Meet	September 2023	February 2024
Guest Lecture/Seminar/Workshop	September 2023	February 2024
Assignment - I	10-09-2023	01-01-2023
MID Examination – I & Quiz - I	25-09-2023 To 30-09-2023	12-02-2024 To 17-02-2024
Mid-Semester Feedback	1-10-2023	18-02-2024
Last date for display of Marks/Answer Scripts	8-10-2023	25-02-2024
Class work – 2nd Phase of Instruction (From… To…)	02-10-2023 To 25-11-2023	19-02-2024 To 13-04-2024
Remedial classes	After 1st MID	After 1st MID
Class Review Committee Meeting-II	November 2023	April 2024
Guest Lecture/Seminar/Workshop	November 2023	March 2024
Assignment - II	01-11-2023	22-03-2024
MID Examination – II & Quiz - II	20-11-2023 To 25-11-2023	08-04-2024 To 13-04-2024
Class work last working day	18-11-2023	05-04-2024
End-Semester Feedback & Course End Survey	26-11-2023	14-04-2024
Last date for display of Marks/Answer Scripts	30-11-2023	21-04-2024
Preparation holidays and Semester End Practical Examinations	27-11-2023 To 09-12-2023	15-04-2024 To 27-04-2024
Semester End Theory Examinations	11-12-2023 To 23-12-2023	29-04-2024 To 11-05-2024
Summer Internship	--	13-05-2024 To 06-07-2024

HOD

HEAD OF THE DEPARTMENT
Information Technology
Sir C.R.R. College of Engg.
ELURU-534 007

PRINCIPAL

Principal
Sir C.R.R.College of Engineering
ELURU - 534 007

Course Description

This course will give overview on a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. It also will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems. Students also learn about protection, access control, and authentication.

Course Objectives

The objectives of this course is to

- Introduce to the internal operation of modern operating systems
- Define, explain, processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems
- Understand File Systems in Operating System like UNIX/Linux and Windows
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism
- Analyze Security and Protection Mechanism in Operating System

Course Outcomes

Students are able to

CO No's	COs	Level
CO1	**Understand** the basic concepts and functions of OS.	L2
CO2	**Apply** scheduling concepts like process, disk and memory management concepts, file concepts and deadlocks for given problem.	L3
CO3	**Analyze** various scheduling, memory allocation, replacement and thread concepts in various scenarios.	L4
CO4	**Evaluate** various scheduling, replacement and implementation issues for various platforms.	L5

S.No	Unit	Description	Teaching Aids	CO
1.	I	Operating Systems Overview: Operating system functions	BB	CO1
2.		Operating system structure	BB	CO1
3.		Operating systems operations	BB	CO1
4.		Computing environments	BB	CO1
5.		Open-Source Operating Systems	BB	CO1
6.		System Structures: Operating System Services	BB	CO1
7.		User and Operating-System Interface	PPT	CO1
8.		Systems calls	PPT	CO1
9.		Types of System Calls	PPT	CO3
10.		System programs	BB	CO1
11.		Operating system structure	PPT	CO1
12.		Operating system debugging	BB	CO1
13.		System Boot	BB	CO1
		UNIT-II		
14.	II	Process Concept: Process scheduling	PPT	CO1
15.				
16.		Operations on processes	BB	CO1
17.		Inter-process communication	BB	CO2
18.		Communication in client server systems	BB	CO1
19.		Multithreaded Programming: Multithreading models,	BB	CO1
20.		Thread libraries	BB	CO1

21.		Threading issues	BB	CO1
22.		Process Scheduling: Basic concepts	BB	CO1
23.		Scheduling criteria	BB	CO4
24.		Scheduling algorithms	BB	CO3
25.		Multiple processor scheduling, Thread scheduling	PPT	CO1
26.		Inter-process Communication: Race conditions	PPT	CO2
27.		Critical Regions	BB	CO1
28.		Mutual exclusion with busy waiting	BB	CO1
29.		Sleep and wakeup	PPT	CO1
30.		Semaphores	PPT	CO1
31.		Mutexes	PPT	CO1
32.		Monitors	PPT	CO1
33.		Message passing, Barriers	BB	CO1
34.		Classical IPC Problems - Dining philosophers problem	PPT	CO2
35.		Readers and writers problem	BB	CO4
		UNIT III		
36.		Memory-Management Strategies: Introduction, Swapping	BB	CO1
37.		Contiguous memory allocation	BB	CO1
38.		Paging	BB	CO1
39.		Segmentation	BB	CO2
40.		Virtual Memory Management: Introduction	BB	CO1
41.		Demand paging	BB	CO1
42.		Copy on-write	BB/PPT	CO1
43.		Page replacement	BB	CO3
44.		Frame allocation	BB/PPT	CO4
45.		Thrashing	BB/PPT	CO1

46.		Memory-mapped files	PPT	CO1
47.		Kernel memory allocation	BB	CO1
		UNIT IV		
48.		Deadlocks: Resources	BB	CO1
49.	**IV**	Conditions for resource deadlocks	BB	CO1
50.		Ostrich algorithm	BB	CO1
51.		Deadlock detection and recovery	PPT	CO1
52.		Deadlock avoidance	PPT	CO2
53.		Deadlock prevention	BB	CO1
54.		File Systems: Files	BB	CO1
55.		Directories	BB	CO1
56.		File system implementation	BB	CO4
57.		management and optimization	BB	CO4
58.		Secondary-Storage Structure: Overview of disk structure, and attachment	PPT	CO1
59.		Disk scheduling	BB	CO3
60.		RAID structure	BB	CO1
61.		Stable storage implementation	BB	CO1
		UNIT V		
62.		System Protection: Goals of protection	BB	CO1
63.		Principles and domain of protection	BB	CO1
64.		Access matrix	BB	CO1
65.	**V**	Access control, Revocation of access rights	BB	CO1
66.		System Security: Introduction	PPT	CO1
67.		Program threats	BB	CO1
68.		System and network threats	BB	CO3
69.		Cryptography for security	PPT	CO2
70.		User authentication,	BB	CO1
71.		Implementing security defenses	BB	CO1
72.		Firewalling to protect systems and networks	BB	CO1
73.		Computer security classification	BB	CO1
74.		Case study: Linux , Microsoft Windows	BB	CO4
Total Classes			**66**	**8**

Reference Books: Links:

Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.

2) Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
3) Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

Text Books:
1) Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2) Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	1	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	2	-	-
AVG	3	2	2	-	-	-	-	-	-	-	-	1	-	-

Evaluation Pattern

The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The performance of a student in each semester shall be evaluated subject–wise with a maximum of 100 marks for theory subject and 50 marks for practical subject. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Examinations.

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	–	50	50
5	Project Work	60	140	200

Continuous Internal Theory Evaluation:

(a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (ii) one descriptive examination and (iii) one assignment. The online examination (objective) shall be 10 marks and descriptive examination shall be for 15 marks with a total duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for descriptive paper).

(b) The first online examination (objective) is set with 20 multiple choice questions for 10 marks (20 questions x ½ marks) from first two and half units (50% of the syllabus) and it is conducted by **University Examination Section.** The descriptive examination is set with 3 full questions for 5 marks each from first two and half units (50% of the syllabus), the student has to answer all questions. In the similar lines, the second online and descriptive examinations shall be conducted on the rest of the syllabus.

(c) The assignment is given by the concerned class teacher for five marks from first two and half units (50% of the syllabus). The second assignment shall be given from rest of the syllabus. The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.

(d) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive examination and assignment shall be submitted to the University examination section within one week after completion of first mid examination.

(e) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of the students.

(f) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university examination section within one week from the submission.

(g) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptiveexamination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from the submission.

(h) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for another mid exam.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination-1 +one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2 +one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2)

(i) With the above criteria, university examination section will send mid marks of all subjects in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.

The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed by controller of examinations, JNTUK.

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 50)	Level	Letter Grade	Grade Point
≥ 90	≥ 45	Outstanding	A+	10
≥80 to <89	≥40 to <44	Excellent	A	9
≥70 to <79	≥35 to <39	Very Good	B	8
≥60 to <69	≥30 to <34	Good	C	7
≥50 to <59	≥25 to <29	Fair	D	6
≥40 to <49	≥20 to <24	Satisfactory	E	5
<40	<20	Fail	F	0
-		Absent	AB	0

Day/Time	09.00-09.50	09.50-10.40	11.00-11.50	11.50-12.40	01.40-02.30	02.30-03.20	03.20-04.10	04.10-05.00
Mon				OS(A)		OS(B)		
Tue	OS(B)		OS(A)		OS LAB(A)			
Wed			OS(B)		OS(A)			
Thu	OS(A)		OS(B)					
Fri				OS(A)				
Sat		OS LAB(B)						

Operating Systems Important Questions

Operating systems Unit Wise Question Bank

UNIT-1
Short answers:
1) Explain system call
2) Define os?
3) What is symmetric and asymmetric multiprocessing?
4) Explain Chmod
5) What is miscellaneous system calls?
6) What is the role of monololithic system?
7) What is multiprogramming?
8) What do you meant by time sharing systems?
9) Differentiate user thread and kernel thread

Long:
1) What are the concepts of os?
2) Explain the structures of an os?
3) Describe the history of os?
4) Explain the architecture of unix os?
5) What are the services of os?
7) What is the need of system calls?Briefly explain the types of system calls provided by an os?
8) What are the functions of os?

UNIT-2
Short answers:
1) What is meant by process scheduling?
2) Define busy waiting and spin lock
3) What are the five major activities of an os in regard to process management?
4) What is race condition?
5) What are the parts of PCB?
6) How thread is different from process?

7) Explain scheduling criteria

Long answers:

1) Explain about process states? And also operation on process
2) What is synchronization? Explain how semaphore can be used to deal with n-process critical section problem?
3) Explain various types of scheduling algorithms with an example?(FCFS,SJF,RR,SJF,PRIORTY)
4) Discuss the producer consumer pblm?
5) Explain IPC? Dining philosopher pblm
6) Explain process management in ms_Dos?
7) Explain different Multi-threading models?
8) Explain Semaphores?
9) Discuss Monitors ?

UNIT-3

Short answers:

1) What is paging
2) What is thrashing?
3) Explain roll back Define dynamic linking and dynamic loading
4) Define page fault
5) What are the 3major activities of an os in regard to memory management?
6) Explain the events in page fault handling
7) What is device independence?
8) What are the three essential requirements for long term information storage?
9) Explain second chance replacement algorithm

Long:

1) What are the design issues for paging systems
2) Explain implementation of pure segmentation
3) Compare paging and segmentation
4) What is virtual memory? Explain it
5) Discuss about segmentation?
6) Explain any three page replacement algorithms
7) What is fragmentation?Explain internal and external fragmentation
8) Explain paging with segmentation
9) What is thrashing and explain how thrashing is detected and how the os responds to thrashing?

UNIT-4

Short answers:

1) List out the file operations that are commonly done
2) What is meant by disk management
3) What are the most common schemes for defining the logical structure of a directory?
4) What is sequential acess in file acess?
5) What is deadlock
6) Is it possible to have a deadlock involving only one single process?Why?
7) What are the different strategies are used for dealing with deadlock

Long answers:

1) discuss about file system implementation
2) explain single-level directory systems
3) explain any three kinds of file structures
4) explain the different allocation methods and discuss its merits and demerits
5) write notes on disk management
6) explain the different file allocation method
7) explain different disk scheduling algorithms
8) what is meant by raid and explain different raid levels?
9) disuss about deadlock detection and recovery
10) write shortnotes on deadlock avoidance
11) how to avoid the deadlock and illustrate it with bankers algorithm
12) how to recover from deadlock
13) what are the conditions of deadlock?explain with example
14) explain about deadlock detection and recovery
15) what are the different condition for deadlock?
16) discuss deadlock detective with multilple resources?

UNIT-5

Short answers

1) What is program threat
2) What is logic bomb
3) List various security threat
4) What is protection

Long answers

1) Discuss about security and protection mechanisms
2) What are the significant features of unix
3) Discuss about the unix command related to file manipulation
4) List and explain few internal and external commands of ms-dos
5) Explain access control list as a protection mechanism
6) Explain in detail about Program threats
7) Discuss Cryptography as a security tool
8) Explain various Security problem