	COURSE PLAN	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **Abhay Kumar**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**

COURSE DETAILS

Name Of The Programme:: **BTech** Batch:: **2014-18**
Designation:: **ASSOC PROFESSOR**
Year **2015-2016** Semester **II**
Department:: **CSE**
Title of The Subject **OPERATING SYSTEMS** Subject Code **C225B**
No of Students **115**

	COURSE PLAN	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**

1. TARGET

a) Percentage Pass **100**

b) Percentage I class **95**

2. COURSE PLAN

(Please write how you intend to cover the contents: i.e., coverage of Units by lectures, guest lectures, design exercises, solving numerical problems, demonstration of models, model preparation, or by assignments, etc.)

a) coverage of Units by lectures
b) design exercises
c) demonstration of models
d) by assignments

3. METHOD OF EVALUATION

3.1. √ Continuous Assessment Examinations (CAE 1, CAE 2)

3.2. ☐ Assignments / Seminars

3.3. ☐ Mini Projects

3.4. ☐ Quiz

3.5. ☐ Term End Examination

3.6. ☐ Others

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

Signature of HOD
Date:

Signature of Faculty
Date:

	GUIDELINES TO STUDY THE SUBJECT	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**

Designation: **ASSOC PROFESSOR**

Department:: **CSE**

Guidelines for Preparing the Course:

Course Description:
To study concepts related to operating systems, like process management, concurrency and control of processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization and implementation. Also to study different methods for protection and security that is becoming vital now-a-days.

Course Objectives (CO):
1. To master the basic concepts related to operating systems. To learn in detail about process management. 2. To master concurrency and control of processes like critical-section problems and its solution. To understand memory management functions of operating systems. 3. To familiar with principles of deadlock and its prevention. To understand the concepts of file system interface. 4. To familiar with file system implementation. To understand mass storage management functions of operating systems. 5. To familiar with Protection and security aspects of operating systems. To expose to other operating systems like distributed OS, Multi-processor OS, RTOS and Mobile OS.

Learning Outcomes (LO):
1. Master the basic concepts related to operating systems and in detail about process management. 2. Master concurrency and control of processes like critical-section problems and its solution and understand memory management functions of operating systems. 3. Be familiar with principles of deadlock and its prevention and the concepts of file system interface. 4. Be familiar with file system implementation and understand mass storage management functions of operating systems. 5. Be familiar with Protection and security aspects of operating systems and be exposed to other operating systems like distributed OS, Multi-processor OS, RTOS and Mobile OS.

	COURSE OBJECTIVES	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**

On completion of this Subject / Course the student shall be able to:

S.No.	Objectives (CO)	Outcomes (LO)
1.	To master the basic concepts related to operating systems. To learn in detail about process management.	1
2.	To master concurrency and control of processes like critical-section problems and its solution. To understand memory management functions of operating systems.	1,2
3.	To familiar with principles of deadlock and its prevention. To understand the concepts of file system interface.	2,3
4.	To familiar with file system implementation. To understand mass storage management functions of operating systems.	4
5.	To familiar with Protection and security aspects of operating systems. To expose to other operating systems like distributed OS, Multi-processor OS, RTOS and Mobile OS.	5

Signature of Faculty
Date:

Note: For each of the OBJECTIVE indicate the appropriate OUTCOMES to be achieved.
Kindly refer Page 16, to know the illustrative verbs that can be used to state the objectives.

	COURSE OUTCOMES	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**

The expected outcomes of the Course / Subject are:

S.No.	General Categories of Outcomes	Specific Outcomes of the Course
A.	An ability to understand Operating System knowledge using mathematics, science, and engineering	Students were able to design mathematical model of OS independently.
B.	An ability to design and conduct experiments, as well as to analyze and interpret data	Students were able to analyze and interpret date, design flowchart and were able to write flowchart and programs independently.
C.	An ability to design a system, component, or process to meet desired needs within realistic Constraints such as economic, environmental, social, political, ethical, health and safety, Manufacturability and sustainability	
D.	An ability to function on multi-disciplinary teams	
E.	An ability to identify, formulate, and solve engineering problems	
F.	An understanding of professional and ethical responsibility	
G.	An ability to communicate effectively	
H.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	To design OS.
I.	A recognition of the need for, and an ability to engage in life-long learning	Students were self motivated as they can understand and write Programs with deep knowledge on how operating system works.
J.	A knowledge of contemporary issues	
K.	An ability to use the techniques, skills, and modern engineering tools necessary for Engineering practice.	

Objectives – Outcome Relationship Matrix (Indicate the relationships by ☒ mark).

Objectives \ Outcomes	A	B	C	D	E	F	G	H	I	J	K
1.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.											
8.											
9.											
10.											

	COURSE SCHEDULE	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **OPERATING SYSTEM**

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	Operating System Overview and Process Management	14/12/2015	4/1/2016	17
2.	Concurrency and Memory Management	4/1/2016	27/1/2016	16
3.	Principles of Deadlock	29/1/2016	22/2/2016	16
4.	File System Implementation and Mass Storage Overview	22/2/2016	14/3/2016	16
5.	Protection, Security and Advanced Operating Systems	14/3/2016	4/4/2016	16

Total No. of Instructional periods available for the course: 81 Periods (50 minutes per period)

Text Books:

TB1 - Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.

TB2 - A Concept based Approach- D.M.Dhamdhere, 2nd Edition, TMH.

	SCHEDULE OF INSTRUCTIONS UNIT - I	2015-16 Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **17**

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	14/12/2015	1,2	Overview of Computer Operating Systems	CO1, CO2, LO1	TB2 Page No 31 to 35
2	16/12/2015	3	Operating System Functions.	CO1, CO2, LO1	TB1 Page No 23 to 29
3	18/12/2015	4	Protection and Security	CO1, CO2, LO1	TB1 Page No 29 to 30
4	18/12/2015	5	Distributed Systems,	CO1, CO2, LO1	TB1 Page No 30 to 32
5	19/12/2015	6	Special Purpose Systems.	CO1, CO2, LO1	TB1 Page No 32 to 34
6	21/12/2015	7	Operating System Structures	CO1, CO2, LO1	TB1 Page No 70 to 75
7	21/12/2015 23/12/2015	8,9	Operating system services and system calls.	CO1, CO2, LO1	TB2 Page No 49 to 65
8	26/12/2015	10	Operating systems Generation	CO1, CO2, LO1	TB2 Page No 88 to 89
9	28/12/2015	11	Process Concepts	CO1, CO2, LO1	TB2 Page No 101 to 104
10	28/12/2015	12	Threads	CO1, CO2, LO1	TB1 Page No 165 to 170
11	30/12/2015	13	Scheduling Criteria	CO1	TB1 Page No 187 to 188
12	1/1/2016	14,15	Scheduling Algorithms	CO1	TB1 Page No 188 to 199
13	2/1/2016	16	Algorithm Evaluation	CO1	TB1 Page No 213 to 217

14	4/1/2016	17	Thread Scheduling	CO1, CO2, LO1	TB1 Page No 199 to 200

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS	2015-16
	UNIT - II	Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **16**

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	4/1/2016	1	Process Synchronization	CO2 CO3 LO2	TB1 Page No 225 to 226
2	6/1/2016	2	Critical section problems	CO2 CO3 LO2	TB1 Page No 227 to 229
3	8/1/2016	3	Peterson's solution , Synchronization homework	CO2 CO3 LO2	TB1 Page No 229 to 234
4	8/1/2016	4	Semaphores , classical problems of Synchronization	CO2 CO3 LO2	TB1 Page No 234 to 244
5	9/1/2016	5	Classical problems of Synchronization	CO2 CO3 LO2	TB1 Page No 239 to 244
6	11/1/2016	6	Monitors , Synchronization problems	CO2 CO3 LO2	TB1 Page No 244 to 256
7	11/1/2016	7	Atomic Transactions	CO2 CO3 LO2	TB1 Page No 257 to 267
8	18/1/2016	8	Memory Management-Swapping	CO2 CO3 LO2	TB1 Page No 322 to 324
9	18/1/2016	9	Contiguous Memory Allocation	CO2 CO3 LO2	TB1 Page No 324 to 327

10	20/1/2016	10	Paging	CO2 CO3 LO2	TB1 Page No 328 to 336
11	22/1/2016	11	Page-table structure	CO2 CO3 LO2	TB1 Page No 337 to 341
12	22/1/2016	12	Segmentation	CO2 CO3 LO2	TB1 Page No 342 to 345
13	23/1/2016	13	Virtual Memory ,Demand Paging	CO2 CO3 LO2	TB1 Page No 357 to 368
14	25/1/2016	14	Page-Replacement Algorithm	CO2 CO3 LO2	TB1 Page No 369 to 382
15	25/1/2016	15	Frames Allocation	CO2 CO3 LO2	TB1 Page No 382 to 386
16	27/1/2016	16	Thrashing	CO2 CO3 LO2	TB1 Page No 386 to 390

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - III	2015-16 Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **16**

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	29/1/2016	1	Principles of Deadlock : Introduction	CO4 CO5 LO3	TB1 Page No 283 to 284
2	29/1/2016	2	System Model	CO4 CO5 LO3	TB1 Page No 283 to 285
3	30/1/2016	3	Deadlock Characterization	CO4 CO5 LO3	TB1 Page No 285 to 290
4	01/2/2016	4	Deadlock Prevention	CO4 CO5 LO3	TB1 Page No 291 to 294
5	01/2/2016 03/2/2016	5,6	Detection Avoidance	CO4 CO5 LO3	TB1 Page No 294 to 300
6	05/2/2016	7	Detection Detection	CO4 CO5 LO3	TB1 Page No 301 to 304
7	05/2/2016	8	Recovery from Deadlock	CO4 CO5 LO3	TB1 Page No 304 to 306
8	06/2/2016	9	File System Introduction	CO4 CO5 LO3	TB1 Page No 421 to 430
9	15/2/2016	10	File System Interface	CO4 CO5 LO3	TB1 Page No 421 to 430
10	15/2/2016	11	File Concepts	CO4 CO5 LO3	TB1 Page No 421 to 430
11	17/2/2016	11	Access Methods	CO4 CO5 LO3	TB1 Page No 430 to 433
12	19/2/2016	11	Directory Structure	CO4 CO5 LO3	TB1 Page No 433 to 444
13	19/2/2016	11	File System Mounting	CO4 CO5 LO3	TB1 Page No 444 to 446

14	20/2/2016	11	File Sharing	CO4 CO5 LO3	TB1 Page No 446 to 451
15	22/2/2016	11	File Protection	CO4 CO5 LO3	TB1 Page No 451 to 456

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS **UNIT - IV**	2015-16 Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **16**

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	22/2/2016	1	File System Implementation - Introduction	CO4 CO5 LO3	TB1 Page No 461 to 463
2	24/2/2016	2	File System Structure	CO4 CO5 LO3	TB1 Page No 461 to 464
3	26/2/2016	3	File System Implementation	CO4 CO5 LO3	TB1 Page No 464 to 470
4	26/2/2016	4	Directory Implementation	CO4 CO5 LO3	TB1 Page No 470 to 471
5	27/2/2016	5	Allocation Methods	CO4 CO5 LO3	TB1 Page No 471 to 479
6	29/2/2016	6	Free-Space Management	CO4 CO5 LO3	TB1 Page No 479 to 481
7	29/2/2016	7	Efficiency and Performance	CO4 CO5 LO3	TB1 Page No 482 to 486

8	02/3/2016	8	Case Studies: UNIX, Linux and Windows	CO4 CO5 LO3	TB1 Page No 801 to 900
9	04/3/2016	9	Mass-Storage Overview - Introduction	CO4 CO5 LO3	TB1 Page No 505 to 507
10	04/3/2016	10	Mass-Storage Structure	CO4 CO5 LO3	TB1 Page No 505 to 508
11	05/3/2016	11	Disk Structure	CO4 CO5 LO3	TB1 Page No 508 to 509
12	09/3/2016	12	Disk Attachment	CO4 CO5 LO3	TB1 Page No 509 to 510
13	11/3/2016	13	Disk Scheduling	CO4 CO5 LO3	TB1 Page No 510 to 515
14	11/3/2016	14	Swap-Space Management	CO4 CO5 LO3	TB1 Page No 520 to 522
15	12/3/2016	15	RAID Structure, Stable-Storage Implementation	CO4 CO5 LO3	TB1 Page No 522 to 533
16	14/3/2016	16	Tertiary Storage Structure	CO4 CO5 LO3	TB1 Page No 534 to 543

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - V	2015-16 Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **16**

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	14/3/2016	1	Protection: Goals of Protection, Principles of Protection	CO4 CO5 LO3	TB1 Page No 591 to 593
2	16/3/2016	2	Domain of Protection, Access Matrix	CO4 CO5 LO3	TB1 Page No 593 to 601
3	18/3/2016	3	Implementation of Access Matrix, Access Control	CO4 CO5 LO3	TB1 Page No 602 to 605
4	18/3/2016	4	Revocation of Access Rights, Capability-Based Systems	CO4 CO5 LO3	TB1 Page No 606 to 609
5	19/3/2016	5	Language-Based Protection. Security: Security Problem	CO4 CO5 LO3	TB1 Page No 610 to 615
6	21/3/2016	6	Program Threats, System and Network Threats	CO4 CO5 LO3	TB1 Page No 625 to 637
7	21/3/2016	7	Cryptography as a Security Tool	CO4 CO5 LO3	TB1 Page No 638 to 648
8	26/3/2016	8	User Authentication	CO4 CO5 LO3	TB1 Page No 649 to 653
9	28/3/2016	9	Implementing Security Defences	CO4 CO5 LO3	TB1 Page No 654 to 660
10	28/3/2016	10	Firewalling to protect Systems and Networks	CO4 CO5 LO3	TB1 Page No 661 to 662
11	30/3/2016	11	Computer-Security Classifications	CO4 CO5 LO3	TB1 Page No 662 to 664
12	01/4/2016	12	Case Studies: UNIX, Linux and	CO4 CO5	TB1 Page No 801 to 900

			Windows	LO3	
13	01/4/2016	13	Advanced Operating Systems Distributed Operating Systems	CO4 CO5 LO3	TB1 Page No 673 to 700
14	02/4/2016	14	Multi-Processor Operating Systems	CO4 CO5 LO3	TB2 Page No 576 to 595
15	04/4/2016	15	Real-Time Operating Systems	CO4 CO5 LO3	TB1 Page No 759 to 449775
16	04/4/2016	16	Mobile Operating Systems.	CO4 CO5 LO3	TB2 Page No 76 to 80

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.

2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	COURSE COMPLETION STATUS	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**

Subject:: **OPERATING SYSTEM** Subject Code: **C225B**

Department::**CSE**

Actual Date of Completion & Remarks, if any

Units	Remarks (Completed on dates given below)	Nos. of Objectives Achieved
Unit 1	04/01/2016	2
Unit 2	27/01/2016	2
Unit 3	22/02/2016	2
Unit 4	14/03/2016	2
Unit 5	04/04/2016	2

Signature of Dean of School
Date:

Signature of Faculty
Date:

NOTE: AFTER THE COMPLETION OF EACH UNIT MENTION THE NUMBER OF OBJECTIVES ACHIEVED.

	TUTORIAL SHEETS - I	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **OPERATING SYSTEM**

Date: 14/12/2015

This Tutorial corresponds to Unit Nos. I, and II

Time: 1pm

Q1. Explain the Computer System using block diagram [1].

Q2. Explain Operating System definition and Concepts [3].

Q3. Explain Operating System Functions and Structures [5].

Q4. Explain Operating System Services and System Calls [5].

Q5. Explain the difference between Program, Process and Threads [2].

Q6. Explain the Process State Diagram using block diagram [3].

Q7. Explain CPU Scheduling Algorithms using examples [4].

Q8. Explain Critical-Section Problem and its Solutions [5].

Q9. Explain Paging and Segmentation [2].

Q10. Explain Page-Replacement Algorithms [3].

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	TUTORIAL SHEETS - II	2015-16
		Regulation: R14

FACULTY DETAILS:

Name of the Faculty:: **ABHAY KUMAR**
Designation: **ASSOC PROFESSOR**
Department:: **CSE**
The Schedule for the whole Course / Subject is:: **OPERATING SYSTEM**

Date: 29/1/2016

This Tutorial corresponds to Unit Nos. III, IV and IV

Time: 1pm

Q1. Explain Deadlock Characterization [1].

Q2. Explain Deadlock Prevention [3].

Q3. Explain Deadlock Avoidance [4].

Q4. Explain object oriented programming in Java and C# [2].

Q5. Explain how to Recovery from Deadlock [3].

Q6. Explain File Concepts and different File Access Methods [4].

Q7. Explain File Allocation Methods [5].

Q8. Explain Disk Scheduling and RAID Structure [5].

Q9. Explain Principles of Protection, Access Control and Capability-Based Systems [4].

Q10. Explain Program Threats, System and Network Threats [5].

Q11. Case Studies: UNIX, Linux and Windows [5].

Q12. Explain Distributed Operating Systems, RTOS and Mobile Operating Systems [5].

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	ILLUSTRATIVE VERBS FOR STATING INSTRUCTIONAL OBJECTIVES	2015-16 Regulation: R14

These verbs can also be used while framing questions for Continuous Assessment Examinations as well as for End – Semester (final) Examinations.

ILLUSTRATIVE VERBS FOR STATING **GENERAL OBJECTIVES**

Know Comprehend	Understand Apply	Analyze Design	Generate Evaluate

ILLUSTRATIVE VERBS FOR STATING **SPECIFIC OBJECTIVES:**

A. Cognitive Domain

1	2	3	4	5	6
Knowledge	**Comprehension Understanding**	**Application** of knowledge & comprehension	**Analysis** of whole w.r.t. its constituents	**Synthesis** combination of ideas/constituents	**Evaluation** judgement
Define	Convert	Change	Breakdown	Categorize	Appraise
Identify	Defend	Compute	Differentiate	Combine	Compare
Label	Describe (a	Demonstrate	Discriminate	Compile	Conclude
List	procedure)	Deduce	Distinguish	Compose	Contrast
Match	Distinguish	Manipulate	Separate	Create	Criticize
Reproduce	Estimate	Modify	Subdivide	Devise	Justify
Select	Explain why/how	Predict		Design	Interpret
State	Extend	Prepare		Generate	Support
	Generalize	Relate		Organize	
	Give examples	Show		Plan	
	Illustrate	Solve		Rearrange	
	Infer			Reconstruct	
	Summarize			Reorganize	
				Revise	

B. Affective Domain		**C. Psychomotor Domain (skill development)**				
Adhere	Resolve	Bend	Dissect	Insert	Perform	Straighten
Assist	Select	Calibrate	Draw	Keep	Prepare	Strengthen
Attend	Serve	Compress	Extend	Elongate	Remove	Time
Change	Share	Conduct	Feed	Limit	Replace	Transfer
Develop		Connect	File	Manipulate	Report	Type
Help		Convert	Grow	Move precisely	Reset	Weigh
Influence		Decrease	Handle	Operate	Run	
Initiate		Demonstrate	Increase	Paint	Set	

	LESSON PLAN Unit-1	2015-16 Regulation: R14

Name of the Faculty: **ABHAY KUMAR**

Subject **OPERATING SYSTEM** Subject Code **C225B**

Unit **I**

INSTRUCTIONAL OBJECTIVES: To have a thorough understanding of the basic concepts of OPERATING SYSTEM concepts and Process Management.

Session No	Topics to be covered	Time	Ref	Teaching Method
1,2	Overview of Computer Operating Systems	50	TB2	Chalkboard
3	Operating System Functions.	50	TB1	Demonstration
4	Protection and Security	50	TB1	Chalkboard
5	Distributed Systems,	50	TB1	Chalkboard
6	Special Purpose Systems.	50	TB1	Chalkboard
7	Operating System Structures	50	TB1	Chalkboard
8,9	Operating system services and system calls.	50	TB1	Chalkboard
10	Operating systems Generation	50	TB1	Chalkboard
11	Process Concepts	50	TB1	Chalkboard
12	Threads	50	TB1	Chalkboard
13	Scheduling Criteria	50	TB1	Chalkboard
14,15	Scheduling Algorithms	50	TB1	Chalkboard
16	Algorithm Evaluation	50	TB1	Chalkboard
17	Thread Scheduling	50	TB1	Chalkboard

On completion of this lesson the student shall be able to (Outcomes)

1. Understand and explain the concepts of OPERATING SYSTEM and its components.
2. Understand and explain the concepts of PROCESS MANAGEMENT.
3. Understand and explain the CPU Scheduling Algorithms.

	ASSIGNMENT **Unit-I**	2015-16 Regulation: R14

Assignment / Questions

Understand the basic concepts of operating system, process management and cpu scheduling algorithms and how it is related to other subjects.

Course Objectives: To have a thorough understanding of the basic concepts of operating system and process management.

Learning Outcomes: Understand and explain operating system and reasons for studying operating system, process state diagram and various CPU scheduling algorithms.

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-II**	2015-16 Regulation: R14

Name of the Faculty: **ABHAY KUMAR**

Subject **OPERATING SYSTEM** Subject Code **C225B**

Unit **II**

INSTRUCTIONAL OBJECTIVES:

1. Be familiar with the Process Synchronization methods.
2. To understand the various Memory Management Schemes.

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Process Synchronization	50	TB1	Chalkboard
2	Critical section problems	50	TB1	Chalkboard
3	Peterson's solution , Synchronization homework	50	TB1	Chalkboard
4	Semaphores , classical problems of Synchronization	50	TB1	Chalkboard
5	Classical problems of Synchronization	50	TB1	PPT
6	Monitors , Synchronization problems	50	TB1	Chalkboard
7	Atomic Transactions	50	TB1	Demonstration
8	Memory Management-Swapping	50	TB1	Demonstration
9	Contiguous Memory Allocation	50	TB1	Demonstration
10	Paging	50	TB1	Chalkboard
11	Page-table structure	50	TB1	Chalkboard
12	Segmentation	50	TB1	Chalkboard
13	Virtual Memory ,Demand Paging	50	TB1	Chalkboard
14	Page-Replacement Algorithm	50	TB1	Chalkboard
15	Frames Allocation	50	TB1	Chalkboard
16	Thrashing	50	TB1	Chalkboard

On completion of this lesson the student shall be able to (Outcomes)

1. Identify and understand different methods of Process Synchronization.
2. Identify and understand different methods of Memory Management.

	ASSIGNMENT **Unit-II**	2015-16
		Regulation: R14

Assignment / Questions

Analyze Process Synchronization and Memory Management Methods?

Course Objectives: Be familiar with the process synchronization and memory management methods.

Learning Outcomes: Understand Semaphores, Monitors, Swapping, Paging and Segmentation.

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-III	2015-16 Regulation: R14

Name of the Faculty: **ABHAY KUMAR**

Subject **OPERATING SYSTEM** Subject Code **C225B**

Unit **III**

INSTRUCTIONAL OBJECTIVES:

1. To have knowledge about principles of deadlock.
2. To have understanding about basic concepts related to Files.

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Principles of Deadlock : Introduction	50	TB1	Chalkboard
2	System Model	50	TB1	Chalkboard
3	Deadlock Characterization	50	TB1	Chalkboard
4	Deadlock Prevention	50	TB1	Chalkboard
5,6	Detection Avoidance	50	TB1	Chalkboard
7	Detection Detection	50	TB1	PPT
8	Recovery from Deadlock	50	TB1	PPT
9	File System Introduction	50	TB1	Chalkboard
10	File System Interface	50	TB1	Chalkboard
11	File Concepts	50	TB1	Chalkboard
12	Access Methods	50	TB1	Chalkboard
13	Directory Structure	50	TB1	Chalkboard
14	File System Mounting	50	TB1	Chalkboard
15	File Sharing	50	TB1	Chalkboard
16	File Protection	50	TB1	Chalkboard

On completion of this lesson the student shall be able to (Outcomes)

1. To have knowledge and understanding about issues related to principles of deadlock and Files.

	ASSIGNMENT **Unit-III**	2015-16
		Regulation: R14

Assignment / Questions

Analyze various deadlock issues and basic concepts of Files?

Course Objectives: To have knowledge about various principles of deadlock and Files.

Learning Outcomes: Enumerate with examples various deadlock prevention, detection avoidance methods and File access methods.

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-IV	2015-16
		Regulation: R14

Name of the Faculty: **ABHAY KUMAR**

Subject **OPERATING SYSTEM** Subject Code **C225B**

Unit **IV**

INSTRUCTIONAL OBJECTIVES:

1. To have understanding about File System Implementation.
2. To have understanding about Mass Storage Overview.

Session No	Topics to be covered	Time	Ref	Teaching Method
1	File System Implementation - Introduction	50	TB1	Chalkboard
2	File System Structure	50	TB1	Chalkboard
3	File System Implementation	50	TB1	PPT
4	Directory Implementation	50	TB1	PPT
5	Allocation Methods	50	TB1	Chalkboard
6	Free-Space Management	50	TB1	Chalkboard
7	Efficiency and Performance	50	TB1	Chalkboard
8	Case Studies: UNIX, Linux and Windows	50	TB1	Chalkboard
9	Mass-Storage Overview - Introduction	50	TB1	Chalkboard
10	Mass-Storage Structure	50	TB1	Chalkboard
11	Disk Structure	50	TB1	Chalkboard
12	Disk Attachment	50	TB1	Chalkboard
13	Disk Scheduling	50	TB1	Chalkboard
14	Swap-Space Management	50	TB1	Chalkboard
15	RAID Structure, Stable-Storage Implementation	50	TB1	Chalkboard
16	Tertiary Storage Structure	50	TB1	Chalkboard

On completion of this lesson the student shall be able to (Outcomes)

1. Familiarity with the various File system implementation methods.
2. Familiarity with the various mass storage concepts.

	ASSIGNMENT **Unit-IV**	2015-16
		Regulation: R14

Assignment / Questions

Analyze File system implementation methods and mass storage concepts?

Course Objectives: To have understanding of File system implementation methods and mass storage concepts.

Learning Outcomes: Familiarity with the basic concepts of File system implementation and mass storage concepts.

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-V	2015-16
		Regulation: R14

Name of the Faculty: **ABHAY KUMAR**

Subject **OPERATING SYSTEM** Subject Code **C225B**

Unit **V**

INSTRUCTIONAL OBJECTIVES: To discuss about Protection, Security and Advanced Operating Systems.

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Protection: Goals of Protection, Principles of Protection	50	TB1	Chalkboard
2	Domain of Protection Access Matrix	50	TB1	PPT
3	Implementation of Access Matrix, Access Control	50	TB1	PPT
4	Revocation of Access Rights, Capability-Based Systems	50	TB1	Chalkboard
5	Language-Based Protection. Security: Security Problem	50	TB1	Chalkboard
6	Program Threats, System and Network Threats	50	TB1	Chalkboard
7	Cryptography as a Security Tool	50	TB1	Chalkboard
8	User Authentication	50	TB1	Chalkboard
9	Implementing Security Defenses	50	TB1	Chalkboard
10	Firewalling to protect Systems and Networks	50	TB1	PPT
11	Computer-Security Classifications	50	TB1	PPT
12	Case Studies: UNIX, Linux and Windows	50	TB1	PPT
13	Advanced Operating Systems Distributed Operating Systems	50	TB1	PPT
14	Multi-Processor Operating Systems	50	TB2	PPT
15	Real-Time Operating Systems	50	TB1	PPT
16	Mobile Operating Systems.	50	TB2	PPT

On completion of this lesson the student shall be able to (Outcomes)

1. Understand and building the skills on Protection, Security and Advanced Operating OS.

	ASSIGNMENT **Unit-V**	2015-16
		Regulation: R14

Assignment / Questions

Analyze recent trends on Protection, Security and Advanced Operating Systems?

Course Objectives: To discuss Protection, Security and Advanced Operating Systems.

Learning Outcomes: Understand issues related to Protection, Security and Advanced Operating Systems.

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.