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**UNIVERSITY OF PETROLEUM & ENERGY STUDIES**

**College of Engineering Studies**

**Dehradun**

**COURSE PLAN**

Programme : B. Tech – CSE (All IBM Branches)

Course : Advanced Database Management System

Course Code : CSEG – 235

No. of credits : 3

Semester : III

Session : 2018-19

Batch : 2017-21

Prepared by : Dr. Jagdish Chandra Patni

Email : [jcpatni@ddn.upes.ac.in](mailto:jcpatni@ddn.upes.ac.in)

Co-Faculties : Dr. Hitesh Kumar Sharma, Mr. Vishwas Rathi, Mr. Pardeep Singh, Mr. Sudeep varshney, Ms. Richa Chaudhary, Ms. Nitika Goenka, Ms. Ankita Shukla

**Approved By**

Faculty HOD/ Prog. Head

UPES Campus Tel : +91-135-2770137

“Energy Acres” Fax : +91 135- 27760904

P.O. Bidholi, , Dehradun

**COURSE PLAN**

1. **PREREQUISITE:**
   1. Basic Knowledge of Database Management System.
2. **PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES (PSOs) for ADVANCED DATABASE MANAGEMENT SYSTEM:**

**B1. PROGRAM OUTCOMES (POs)**

Engineering Graduates will be able to:

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, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, 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 societal 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 multidisciplinary 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 multidisciplinary 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.

**B2. Program Specific Outcomes (PSOs)**

Computer Science Engineering with specialization in Cloud Computing and Virtualization Engineering Graduates will be able to:

PSO1. Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques,

PSO2. Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms.

PSO3: Ability to understand and apply Cloud Computing architecture for scalable, secure and dynamically provisioned business oriented environment with optimized performance tuning and data reliability.

1. **COURSE OUTCOMES FOR ADVANCED DATABASE MANAGEMENT SYSTEM**

**At the end of this course student should be able to**

CO1. Model the database applications using Enhanced Entity Relational Model.

CO2. Explain and analyse the internal storage structures and the searching methods used in Database Management Systems.

CO3. Analyse the background processes involved in transaction processing.

CO4. Explain and analyse the working of concurrency control and recovery techniques.

CO5. Understand the concept of distributed database and object oriented databases.

**Table: Correlation of POs and PSOs v/s COs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO/CO | PO  1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO  9 | PO  10 | PO  11 | PO  12 | PSO  1 | PSO  2 | PSO  3 |
| CO1 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO2 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO3 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO5 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Engineering Knowledge | Problem analysis | Design/development of solutions | Conduct investigations of complex problems | Modern tool usage | The engineer and society | Environment and sustainability | Ethics | Individual or team work | Communication | Project management and finance | Life-long Learning | Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques | Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms. | Apply computing knowledge to assess, design and propose cyber security solutions and perform forensic procedures on digital systems and cyber world using tools and technologies in the area of cyber security and cyber forensics |
| Course Code | Course Title | PO1 | PO2 | PO3 | PO 4 | PO 5 | PO6 | PO 7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CSEG 2005 | Advanced Database Management System | 1 | 1 | 2 |  |  |  |  |  |  |  |  | 2 |  | 3 |  |

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

1. **PEDAGOGY**

* **Presentation,**
* **Voiceover Presentation & Video lectures,**
* **NPTEL videos,**
* **YouTube videos.**

1. **COURSE COMPLETION PLAN**

|  |  |
| --- | --- |
| **Total Class room sessions** | 24 |
| **Total Blackboard sessions** | 12 |
| **Total Quizzes** | 02 |
| **Total Test** | 01 |
| **Total Assignment** | 02 |

One Classroom Session = 60 minutes

1. **EVALUATION & GRADING**

Students will be evaluated based on the following 3 points.

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Assessment** | **Weightage** | **Schedule** |
| 1 | Internal Assessment (IA) | 30% | Detailed Below |
| 2 | Mid-semester Examination (MS) | 20% | Academic Calendar |
| 3 | End-semester Examination (ES) | 50% | Academic Calendar |

**F1. INTERNAL ASSESSMENT: WEIGHTAGE – 30%**

Internal Assessment shall be done based on the following:

|  |  |  |
| --- | --- | --- |
| S. No. | Description | % of Weightage out of 30% |
| 1 | Class Tests | 30% |
| 2 | Quizzes | 30% |
| 3 | Assignments | 20% |
| 4 | Blackboard Content Access | 10% |
| 5 | Attendance and Performance in the class | 10% |

**F2*. Internal Assessment Record Sheet (including Mid Term Examination marks)*** *will be displayed online at the end of semester i.e. last week of regular classroom teaching.*

**F3. CLASS TESTS/QUIZZES:** Two Class Tests based on descriptive type theoretical & numerical questions and Two Quizzes based on objective type questions will be held; one class test and one quiz at least ten days before the Mid Term Examination and second class test and second quiz at least ten days before the End Term Examination. Those who do not appear in Viva-Voce and quiz examinations shall lose their marks.

*The marks obtained by the students will be displayed on LMS a week before the start of Mid Term and End Term Examinations respectively.*

**F4. ASSIGNMENTS:** After completion of each unit or in the mid of the unit, there will be home assignments based on theory and numerical problems. Those who fail to submit the assignments by the due date shall lose their marks.

**F5. GENERAL DISCIPLINE:** Based on student’s regularity, punctuality, sincerity and participation in the interactions.

*The marks obtained by the students will be displayed on LMS at the end of semester.*

**F6. MID TERM EXAMINATION: WEIGHTAGE – 20%**

Mid Term examination shall be Two Hours duration and shall be a combination ofShort and Long theory Questions.

***Date of showing Mid Term Examination Answer Sheets: Within a week after completion of mid Sem examination.***

**F7. END TERM EXAMINATION: WEIGHTAGE – 50%**

End Term Examination shall be Three Hours duration and shall be a combination of Short and Long theory/numerical Questions.

**F8. GRADING:**

The overall marks obtained at the end of the semester comprising all the above three mentioned shall be converted to a grade.

1. **COURSE DELIVERY PLAN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Session** | **TOPICS** | **Course Outcomes Addressed** | **Required Learning Resources**  **(including media)** | **Pedagogy/**  **Discussion(s)/ Postings** | **Assessment** |
|  | **Module 1: Enhanced Entity Relationship Model** | | | | |
| **1** | Relational Model Constraints and Schemas | **CO1** | **[T1] ,**  [**https://www.youtube.com/watch?v=gGGHjYbQMvw**](https://www.youtube.com/watch?v=gGGHjYbQMvw) | **Lecture** |  |
| **2** | Enhanced ER Model | **CO1** | **[T1] ,**  [**https://www.youtube.com/watch?v=zc0Scbjxv-w**](https://www.youtube.com/watch?v=zc0Scbjxv-w) | **Lecture** |  |
| **3** | Specialization and Generalization, Hierarchies and Lattices | **CO1** | **[T1],** [**https://www.youtube.com/watch?v=d8W4MYAxRWg**](https://www.youtube.com/watch?v=d8W4MYAxRWg) **PPTs** | **Readings/ brief video/ presentations** |  |
| **4** | Modeling of UNION Types using Categories | **CO1** | **Faculty Uploaded** | **Lecture** |  |
| **5** | Mapping ER & EER Model into Relations | **CO1** | **[T1],**  [**https://www.youtube.com/watch?v=WIkw87aLAMc**](https://www.youtube.com/watch?v=WIkw87aLAMc) | **Lecture** | **Reflection -1** |
|  | **Module 2: Disk Storage and Indexing** | | | | |
| **6** | Introduction to Secondary Storage Devices | **CO2** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** |  |
| **7** | Seek time, latency, Buffering of Blocks | **CO2** | **[T1]** | **Lecture** |  |
| **8** | File Organization- Sorted, heap files | **CO2** | <https://www.youtube.com/watch?v=B7hVxCmfPtM> | **Lecture** |  |
| **9** | Parallelizing Disk Access using RAID Technology | **CO3** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** | **Assignment 1 release** |
| **10** | Hashing – internal & external | **CO3** | [T1] | **Lecture** |  |
| **11** | Single-Level Indexes – Primary | **CO3** | **[T1],**  [**https://www.youtube.com/watch?v=eTiuaFfaSXQ&index=11&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=eTiuaFfaSXQ&index=11&list=PL52484DF04A264E59) | **Lecture** |  |
| **12** | Clustered and Secondary indexes | **CO3** | [**https://www.youtube.com/watch?v=NUFXNU51uJY&index=12&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=NUFXNU51uJY&index=12&list=PL52484DF04A264E59) | **Readings/ brief video/ presentations** |  |
| **13** | Multilevel Indexes | **CO3** | **Faculty Uploaded PPTs** | **Lecture** |  |
| **14** | B-Trees and B+ Trees | **CO3** | **[T1],**  [**https://www.youtube.com/watch?v=CYKRMz8yzVU**](https://www.youtube.com/watch?v=CYKRMz8yzVU) | **Lecture** |  |
| **15** | Numerical problems based on Indexes & trees | **CO3** |  | **Lecture** | **Quiz 1, Reflection 2** |
|  | **Module 3: Transaction Processing Concepts** | | | | |
| **16** | Introduction to Transaction Processing | **CO4** | **[T1],**  [**https://www.youtube.com/watch?v=5ammL5KU4mo&index=17&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=5ammL5KU4mo&index=17&list=PL52484DF04A264E59) | **Lecture** |  |
| **17** | Transaction and System Concepts, Desirable Properties of Transactions | **CO4** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** |  |
| **18** | Characterizing Schedules based on Recoverability | **CO4** | **[T1]** | **Lecture** |  |
| **19** | Characterizing Schedules based on Serializability | **CO4** | **[T1]** | **Lecture** |  |
| **20** | Precedence graphs & Testing for Conflict Serializability | **CO4** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** | **Reflection-3** |
|  | **Module 4: Concurrency Control and Database Recovery Techniques** | | | | |
| **21** | Introduction to Concurrency Control | **CO5** | **[T1],**  [**https://www.youtube.com/watch?v=EeVDvQLKU0E&index=19&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=EeVDvQLKU0E&index=19&list=PL52484DF04A264E59) | **Lecture** |  |
| **22** | Two Phase Locking Techniques | **CO5** | **[T1],**  [**https://www.youtube.com/watch?v=Qab0d7rwWhI&index=25&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=Qab0d7rwWhI&index=25&list=PL52484DF04A264E59) | **Lecture** |  |
| **23** | Deadlock and Starvation | **CO5** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** | **Reflection -4** |
| **24** | Timestamp Ordering | **CO5** | **[T1]** | **Lecture** |  |
| **25** | Recovery Concepts - Write-Ahead Logging, Steal/No-Steal, and  Force/No-Force | **CO5** | **[T1],**  [**https://www.youtube.com/watch?v=wpcRQEyG0Ds&index=27&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=wpcRQEyG0Ds&index=27&list=PL52484DF04A264E59) | **Lecture** |  |
| **26** | Granularity, Multiple Granularity Locking(MGL) & its matrix | **CO5** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** |  |
| **27** | Recovery Techniques Based on Deferred Update | **CO5** | **[T1],**  [**https://www.youtube.com/watch?v=BQujBzSlEZc&index=28&list=PL52484DF04A264E59**](https://www.youtube.com/watch?v=BQujBzSlEZc&index=28&list=PL52484DF04A264E59) | **Lecture** |  |
| **28** | Immediate Update Shadow Paging | **CO5** | **[T1]** | **Lecture** | **Assignment 2 Release**  **Reflection 4** |
|  | **Module 5: Distributed Databases** | | | | |
| **29** | Distributed Database Concepts | **CO6** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** |  |
| **30** | Types of Distributed Database Systems,  Distributed Database Architecture | **CO6** | [**https://www.youtube.com/watch?v=qMjCliHkdZk**](https://www.youtube.com/watch?v=qMjCliHkdZk) | **Lecture** |  |
| **31** | Data Fragmentation, Replication and Allocation Techniques | **CO6** | [**https://www.youtube.com/watch?v=pGSwasYOv0o**](https://www.youtube.com/watch?v=pGSwasYOv0o) | **Lecture** |  |
| **32** | Example of Fragmentation, Allocation, and Replication | **CO6** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** | **Reflection -5** |
| **33** | Quiz & Test |  |  | **Readings/ brief video/ presentations/Web Search** | **Test- 1(unit 1, 2, 3, 4 & 5)**  **Quiz-2(Unit 4 & 5)** |
|  | **Module 6: Object and Object Relational Databases** | | | | |
| **34** | Overview of Object-Oriented Concepts & Model | **CO6** | **[T1]** | **Lecture** |  |
| **35** | Differences Between Conceptual Design of ODB and RDB | **CO6** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** |  |
| **36** | Introduction to Object Definition Language(ODL) & Object Query Language(OQL) | **CO6** | **Faculty Uploaded PPTs** | **Readings/ brief video/ presentations** | **Reflection -6** |

1. **SUGGESTED READINGS:**

**Text Book**

**T1:** Fundamentals of Database Systems by Ramez Elmasri and Shamkant B. Navathe, Pearson India

**Reference Books**

**R1:** Database System Concepts by Abraham Silberschatz, Henry F. Korth and S. Sudarshan, McGraw-Hill

**R2:** Database Systems-The Complete Book by Jeffrey D. Ullmam, Pearson India

**VIDEO RESOURCES:**

1. NPTEL Lectures –will be available - [\\10.2.1.33](file:///\\10.2.1.33) (intranet)
2. Video Lectures & Voice Over PPT : - Will be available on Blackboard (Information given in the Course Plan)

**GUIDELINES**

***Cell Phones and other Electronic Communication Devices*:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.

***E-Mail and online learning tool:*** Each student in the class should have an e-mail id and a password to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.

***Attendance:*** Students are required to have **minimum attendance of 75%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

**Course outcome assessment:** To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement. Capping

***Passing criterion:*** Student has to secure minimum 30%/40% marks of the “highest marks in the class scored by a student in that subject (in that class/group class)” individually in both the ‘End-Semester examination’ and ‘Total Marks’ in order to pass in that paper.

* Passing Criterion for B. Tech: Minimum 30% and 40% of the highest marks in the class applicable to the students admitted before July 2015 and onwards July 2015 respectively.
* Passing Criterion for M. Tech: minimum 40% of the highest marks in the class

**Sample format for Indirect Assessment of Course outcomes**

|  |
| --- |
| NAME: |
| ENROLLMENT NO: |
| SAP ID: |
| COURSE: |
| PROGRAM: |

Please rate the following aspects of course outcomes of Automotive transmissions systems.

Use the scale 1-4\*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. |  | 1 | 2 | 3 | 4 |
| 1 | CO1-Model the database applications using Enhanced Entity Relational Model. |  |  |  |  |
| 2 | CO2-Explain and analyse the internal storage structures and the searching methods used in Database Management Systems. |  |  |  |  |
| 3 | CO3- Analyse the background processes involved in transaction processing. |  |  |  |  |
| 4 | CO4- Explain and analyse the working of concurrency control and recovery techniques. |  |  |  |  |
| 5 | CO5- Understand the concept of distributed database and object oriented databases. |  |  |  |  |

3

Below Average

Good

1

**\***

Very Good

Average

4

2