Birla Institute of Technology & Science, Pilani
Hyderabad Campus

Academic – Graduate Studies and Research Division
SECOND SEMESTER 2021-2022
(COURSE HANDOUT PART II)

17.01.2022

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.	:	CS G516
Course Title	:	Advanced Database Systems
Instructor-in-Charge	:	Dr. Subhrakanta Panda

Scope and Objective of the Course:
The objective of this course is to include the advance DBMS techniques like object-oriented database, parallel databases, distributed databases, deductive databases, spatial database, multimedia databases, query optimization, information retrieval and XML, data warehousing and data mining etc. The course will also focus on the data related issues in building, analyzing, and maintaining complex software systems. It will highlight the common concepts behind the different applications. The laboratory component will focus to design an interface of database with front end tools and to understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports.

Course Outcome:
The expected outcomes of this course are as follows:
- Students will develop a good understanding of the different architectural as well as the design perspectives of Adv. Database systems.
- Students to gain hands-on exposure designing interfaces of adv. Databases.
- Develop understanding of different query optimization techniques and indexing mechanisms.
- To be able to construct tables and write effective queries, forms and reports.

Textbooks:
1. Raghu Ramakrishnan and Johannes Gehrke, **Database Management System**, 3rd Ed, McGraw-Hill, 2002
2. Silberschatz A, Korth H F, and Sudarshan S, **Database System Concepts**, TMH, 7th Edition, 2020.

Reference books
1. NoSQL Distilled: A brief guide to the emerging polyglot persistence (Paperback) by Sadalage, Pramod, Fowler, Martin, Pearsons Education, 2013.
2. Özsu, M. Tamer, **Valduriez**, Patrick, **Principles of Distributed Database Systems,** Springer third edition, ISBN 978-1-4419-8834-8
3. V. Benjamin Nevarez, **Microsoft Sql Server 2014: Query Tuning And Optimization**, McGraw Hill
4. Elmasri, Navathe, **Fundamentals of Database Systems**, Pearson Education, 2002

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Course Plan:

L No.	Learning objectives	Topics to be covered	Chapter No.
1-6	Understanding different databases	Comparative study of different databases like structured, unstructured, semi-structured, temporal, spatial, multimedia, deductive, parallel, distributed databases etc.	Lecture Notes
7-13	Applying Adaptive Query processing and evaluation techniques for large databases	Adaptive Query Processing and Query Evaluation: Query processing mechanism: eddy, eddy architecture, how eddy allows for extreme flexibility, properties of query processing algorithms, why adaptive query processing is needed, where it is most appropriately used, Hardware and Workload Complexity, Query evaluation techniques for large databases, Query evaluation plans.	T1 Ch 12. T2 Ch 15, 16.
14-18	Understanding Database design and performance tuning	Schema refinement in database design, functional dependencies, normal forms, database workloads, clustering and indexing, choices in tuning the conceptual schema, well known DBMS benchmarks	T1 Ch 16. T2 Ch 14
19-24	Understanding Distributed Database design	Distributed databases: Distributed DBMS architectures, storing data in distributed DBMS, distributed catalogue management, distributed query processing, updating distributed data, distributed transaction, distributed concurrency control, distributed recovery, directory systems, data Replication, data Fragmentation, distributed database transparency features, distribution transparency.	T1 Ch 21 T2 Ch 20, 21
25-30	Learning XML Query processing	Indexing for text search, managing text in DBMS, A data model for XML, querying XML data, efficient evaluation of XML queries.	T1 Ch 22. Lecture Notes
31-42	Understanding NoSQL Data Model	NoSQL data model and schema design, schemaless data representation, types of NoSQL databases: document databases, key-value databases, wide-column stores, and graph databases, data models used in NoSQL, scale-out architecture.	R1, Lecture Notes

Evaluation Scheme:

Sl. No.	Component	Duration	Weightage (%)	Date & Time	Nature of Component
1	Mid-Semester	90 mins	30	As announced by Timetable	Closed Book
2	Quiz Test	30 mins	10	TBA (Before Mid-Semester)	Closed Book
3	Term Paper Presentation (TPP)		10	TBA	Open Book
4	LAB Project (LP)		15	TBA	Open Book
5	Comprehensive	120 mins	35	As announced by Timetable	Open Book

Note:
1. For Comprehensive exam and Mid-semester Test, the mode (offline/online) and the duration are subject to changes as decided by the AGSRD/Timetable division in future.
2. At least 40% of the evaluation components to be completed for Mid-semester grading.

Chamber Consultation Hour: To be announced in the class.

Notices: Notices regarding the course will be put up on the CSIS notice board and/or CMS.

Make-up Policy: No makeup for Quiz Test, TPP, and LP components. ***Make-up*** will be granted as per the guidelines by AUGSD/AGSRD for Mid-Semester and Comprehensive Exams**.** The above mentioned rules will be followed very strictly.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

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CSG527

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CSG527 CC Lab Content Coverage Plan

Declaration: Since the classes will be held in online mode. So students are required to install Java, Eclipse, and other Software as required in their respective Laptops/Desktops.

Exp#	Lab coverage of topics	Ref
1	Check Virtualization support in Linux and Windows based Machine, Oracle Virtualbox, Hyper-V Support.	T1 Ch 9; R1 Ch 3; T2 Ch 5; Online Resources
2	Installation and Deployment of KVM. Create Virtual Machines on KVM. Explore other open source Cloud Platforms.	T1 Ch 9; R1 Ch 3; T2 Ch 5; Online Resources
3	Create a shared folder in VMWare Workstation	Online Resources
5	Create virtual instance, provide S3 support to virtual instance in AWS/Openstack	T1 Ch 2; Online resources
6	Create virtual instance and provide volume support in AWS/Openstack	T1 Ch 2; Online resources
7	Perform a cold migration of VM from one data store to another.	T1 Ch 2; Online resources
8	Create a setup to demo Auto-scaling feature of AWS cloud	T1 Ch 2; Online resources
9	Use Docker containers in AWS	T1 Ch 2; Online resources
10	Install Openstack and configure the Orchestration service called heat, on the controller node.	Online resources
11	Install GAE, upload a local application to GAE	T1 Ch 3; R2; Lecture notes
12	Create a load balancer in Cloudsim	Online resources
13	Implement Elastic MapReduce word-count example using AWS	R6 Ch 8; Online resources
14	Hadoop Map reduce-market rating Java example, word-count on Hadoop Sandbox Environment.	Online resources

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