Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Advanced Database Management Systems **Semester : III**
Program: B.Tech.-CSE with all specialization **Time : 03 hrs.**
Course Code: CSEG2017 **Max. Marks : 100**

Instructions:

SECTION A (Attempt all questions)

S. No.	Question	Marks	CO
Q 1	Differentiate between external, internal, and conceptual schemas. How are these different schema layers related to the concepts of logical and physical data independence?	**4**	**CO1**
Q 2	Through suitable example explain the following terms briefly: • Generalization and Specialization • Aggregation • Disjoint and overlapping constraints • Total and partial constraints	**4**	**CO2**
Q 3	Consider ordered data file with following parameters: Number of records = 16348 Record size = 32 bytes Block size = 1024 bytes Index is stored as (key + pointer) pair with the following parameters: Key value = 10 bytes Block pointer = 6 bytes • Find the number of first level and second level blocks required for multilevel index. • Draw the appropriate diagram and justifying your answer.	**4**	**CO3**
Q 4	A file of 4096 blocks is to be sorted with an available buffer space of 64 blocks. How many passes will be needed in the merge phase of the external sort-merge algorithm?	**4**	**CO4**
Q 5	Discuss the ACID properties in transaction management.	**4**	**CO6**
	SECTION B (Attempt all questions)		
Q 6	List out the different reasons of choosing a database system instead of simply storing data in operating system files? When would it make sense not to use a database system?	**8**	**CO1**
Q 7	A university registrar's office maintains data about the following entities: a) Courses, including number, title, credits, syllabus, and prerequisites. b) Course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom. c) Students, including student-id, name, and program. d) Instructors including identification number, name, department, and title.	**8**	**CO2**

	Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.		
Q 8	Consider a disk with a sector size of 512 bytes, 2000 tracks per surface, 50 sectors per track, five double-sided platters, and average seek time of 10 msec. a) What is the capacity of a track in bytes? b) What is the capacity of each surface? c) What is the capacity of the disk? d) How many cylinders does the disk have?	**8**	**CO3**
Q 9	Discuss in detail the Relational Model Constraints and its types. **Or** Consider a relation R with attributes ABCDEFGH and functional dependencies S as follows: S = {A → CD, ACF → G, AD → BEF, BCG → D, CF → AH, CH → G, D → B, H → DEG} Find all keys for R.	**8**	**CO4, CO5**
Q 10	Consider a database with objects X and Y and assume that there are two transactions T1 and T2. Transaction T1 reads objects X and Y and then writes object X. Transaction T2 reads objects X and Y and then writes objects X and Y. a) Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-read conflict. b) Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a read-write conflict. c) Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-write conflict. **Or** Explain the main concept used in object database system.	**8**	**CO6**
SECTION-C(Attempt all questions)			
Q 11	Consider a relation R(A, B, C, D, E, F, G, H, I, J) with functional dependencies: { AB → C, A → DE, B → F, D → IJ, F → GH} List all the functional dependencies that violate 2NF, 3NF, BCNF. If any, then decompose R accordingly. Also check that normalized form after conversion into BCNF is lossy/lossless and dependency preserving/non dependency preserving?	**20**	**CO5**
Q12	a) Find the number of block access in case of primary index, secondary index and without index for the following detail: No of records in main file=20000 Record size in main file =150 bytes Block size=2048 Record size in index file=20 bytes b) Explain the different way to implement 'Select' operation. Compare them on the basis of number of block access. **Or** a) Explain the role and responsibilities of different actors and users of DBMS. b) What is the two-phase locking protocol? How does it guarantee serializability? Show it through an example.	**(10 + 10)**	**CO3, CO4** **CO1, CO6**