CIRCULAR:-
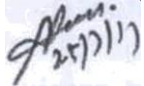
A reference **is invited to** the Syllabi relating to the B.Sc. degree course, <u>vide</u> this office Circular No. UG/42 of 2016-17, dated 5th August , 2016 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by Ad-hoc-Board of Studies Ln Computer Science at its meeting held on **5/5/2017 has** been accepted by the Academic Council at its meeting held on 11.5.2017 <u>vide</u> item No. 4.210 and that in accordance therewith, in revised syllabus as per the Credit Based Semester and Grading System for S.Y.B.Sc Computer Science (Sem III & IV) which is available on the University's website (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2016-17.

REGISTRAR

MUMBAI — 400 032
July, 2017

To,

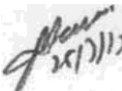The Principal of the affiliated Colleges in Science and the Head of Recognized Institutions concerned.

A.C/4.210/11.05.2017

›>Io. **UG/)bJ- A** of 2017   .M   AJ-40*0 032   ఇ౼ꜧ July, 2017

Copy forwarded with compliments for inTorr•.a.tion to

l) The Co-ordinator, Faculty of Science.,
2) The Offg. Director of Board of Examinations and Evaluation,
3) The Chairperson, Board of Studies in Botar.y,
4) The Director of Board of Studies Development.
5) The Professor-cum-Director, Ir.stitute of Distance and Open Leamlng.
6) The Co-Ordinator, University Cen.puierization Centre.

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UNIVERSITY OF MUMBAI

Syllabus for Sem III
Program: B.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2017-2018)

Preamble

The revised and restructured curriculum for the Three-year integrated course is systematically designed considering the current industry needs in terms of skills sets demanded under new technological environment. It also endeavours to align the programme structure and course curriculum with student aspirations and corporate expectations. The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Second year of this course is about studying core computer science subjects. Theory of Computation course provides understanding of grammar, syntax and other elements of modern language designs. It also covers developing capabilities to design formulations of computing models and its applications in diverse areas.

The course in Operating System satisfies the need of understanding the structure and functioning of system. Programming holds key indispensable position in any curriculum of Computer Science. It is essential for the learners to know how to use object oriented paradigms. There is also one dedicated course Android Developer Fundamentals as a skill enhancement catering to modern day needs of Mobile platforms and applications. The syllabus has Database Systems courses in previous semesters. The course in Database Management Systems is its continuation in third semester. The course has objectives to develop understanding of concepts and techniques for data management along with covers concepts of database at advance level.

The course of Combinatorics and Graph Theory in third semester and the course of Linear Algebra in fourth semester take the previous courses in Mathematics. Graph theory is rapidly moving into the mainstream mainly because of its applications in diverse fields which include can further open new opportunities in the areas of genomics, communications networks and coding theory, algorithms and computations and operations research.

Introducing one of the upcoming concepts Physical Computing and IoT programming will definitely open future area as Embedded Engineer, involvement in IoT projects, Robotics and many more. The RasPi is a popular platform as it offers a complete Linux server in a tiny platform for a very low cost and custom-built hardware with minimum complex hardware builds which is easier for projects in education domain.

S.Y.B.Sc. (Semester III and IV)
Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2017-2018

SEMESTER III			
Course	**TOPICS**	**Credits**	**L / Week**
USCS301	Theory of Computation	2	3
USCS302	Core JAVA	2	3
USCS303	Operating System	2	3
USCS304	Database Management Systems	2	3
USCS305	Combinatorics and Graph Theory	2	3
USCS306	Physical Computing and IoT Programming	2	3
USCS307	Skill Enhancement: Web Programming	2	3
USCSP301	USCS302+USCS303+USCS304	3	9
USCSP302	USCS305+USCS306+USCS307	3	9

SEMESTER IV			
Course	**TOPICS**	**Credits**	**L / Week**
USCS401	Fundamentals of Algorithms	2	3
USCS402	Advanced JAVA	2	3
USCS403	Computer Networks	2	3
USCS404	Software Engineering	2	3
USCS405	Linear Algebra using Python	2	3
USCS406	.NET Technologies	2	3
USCS407	Skill Enhancement: Android Developer Fundamentals	2	3
USCSP401	USCS401+ USCS402+ USCS403	3	9
USCSP402	USCS405+ USCS406+ USCS407	3	9

Course: **USCS304**	**TOPICS (Credits : 02 Lectures/Week:03)** **Database Management Systems**

	Objectives:

Objectives:

To develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage.

Expected Learning Outcomes:

1. Master concepts of stored procedure and triggers and its use.
2. Learn about using PL/SQL for data management
3. Understand concepts and implementations of transaction management and crash recovery

Unit I	**Stored Procedures:** Types and benefits of stored procedures, creating stored procedures, executing stored procedures, altering stored procedures, viewing stored procedures. **Triggers:** Concept of triggers, Implementing triggers – creating triggers, Insert, delete, and update triggers, nested triggers, viewing, deleting and modifying triggers, and enforcing data integrity through triggers. **Sequences**: creating sequences, referencing, altering and dropping a sequence. **File Organization and Indexing:** Cluster, Primary and secondary indexing, Index data structure: hash and Tree based indexing, Comparison of file organization: cost model, Heap files, sorted files, clustered files. Creating, dropping and maintaining indexes.	**15L**
	Fundamentals of PL/SQL: Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Datetime and Interval Types.	

Unit II	**Overview of PL/SQL Control Structures:** Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IFTHEN-ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, Sequential Control: GOTO and NULL Statements	**15L**
Unit III	**Transaction Management:** ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem , Read-Write Locks, Deadlocks Handling, Two Phase Locking protocol. **DCL Statements:** Defining a transaction, Making Changes Permanent with COMMIT, Undoing Changes with ROLLBACK, Undoing Partial Changes with SAVEPOINT and ROLLBACK **Crash Recovery:** ARIES algorithm. The log based recovery, recovery related structures like transaction and dirty page table, Write-ahead log protocol, check points, recovery from a system crash, Redo and Undo phases.	**15L**

Textbook(s):

1) Ramakrishnam, Gehrke, Database Management Systems, Bayross, McGraw-Hill,3rd Edition
2) Abraham Silberschatz, Henry F. Korth,S. Sudarshan , Database System Concepts, 6th Edition
3) Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications

Additional Reference(s):

1) Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education
2) Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press.
3) Joel Murach, Murach's MySQL, Murach

Suggested List of Practical- SEMESTER III

USCS304: Database Management Systems

1. Creating and working with Insert/Update/Delete Trigger using Before/After clause.
2. Writing PL/SQL Blocks with basic programming constructs by including following:

   a. Sequential Statements b. unconstrained loop
3. Sequences:

   a. Creating simple Sequences with clauses like START WITH, INCREMENT BY, MAXVALUE, MINVALUE, CYCLE | NOCYCLE, CACHE | NOCACHE, ORDER | NOORECER.

   b. Creating and using Sequences for tables.
4. Writing PL/SQL Blocks with basic programming constructs by including following:

   a. If...then...Else, IF...ELSIF...ELSE... END IF

   b. Case statement
5. Writing PL/SQL Blocks with basic programming constructs for following Iterative Structure:

   a. While-loop Statements

   b. For-loop Statements.
6. Writing PL/SQL Blocks with basic programming constructs by including a GoTO to jump out of a loop and NULL as a statement inside IF
7. Writing Procedures in PL/SQL Block

   a. Create an empty procedure, replace a procedure and call procedure

   b. Create a stored procedure and call it

   c. Define procedure to insert data

   d. A forward declaration of procedure
8. Writing Functions in PL/SQL Block.

   a. Define and call a function

   b. Define and use function in select clause,

   c. Call function in dbms_output.put_line

   d. Recursive function

   e. Count Employee from a function and return value back

   f. Call function and store the return value to a variable
9. Writing a recursive Functions in PL/SQL Block
10. Study of transactions and locks

Evaluation Scheme

I.   Internal Exam - 25 Marks

(i) Test – 20 Marks

20 marks Test – Duration 40 mins
It will be conducted either using any open source learning management system like Moodle (Modular object-oriented dynamic learning environment)

OR

A test based on an equivalent online course on the contents of the concerned course (subject) offered by or build using MOOC (Massive Open Online Course) platform.

(ii) 5 Marks – Active participation in routine class instructional deliveries
Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II.   External Exam– 75 Marks

III.   Practical Exam – 50 Marks

-   Each course carry 50 Marks : 40 marks + 05 marks (journal) + 05 marks (viva)
-   Minimum 75 % practical from each paper are required to be completed and written in the journal**.**

(Certified Journal is compulsory for appearing at the time of Practical Exam)

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