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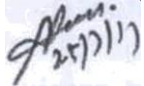
A reference **is invited to** the Syllabi relating to the B.Sc. degree course, vide this office Circular No. UG/42 of 2016-17, dated 5th August , 2016 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by Ad-hoc-Board of Studies Ln Computer Science at its meeting held on **5/5/2017 has** been accepted by the Academic Council at its meeting held on 11.5.2017 vide 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 Prin.cipal of the affiliated Colleges in Science and the Head of Recognized Institutions concerned.
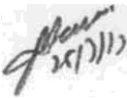
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›>Io. **UG/)bJ- A** of 2017   .M   AJ-40*0 032   २७ᴴᶯ July, 2017

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 IV
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

Suggested List of Practical – SEMESTER IV

Course: USCSP401	(Credits : 03 Lectures/Week:09) USCS401+ USCS402+USCS403	

USCS401: Fundamentals of Algorithms

1. Write Python program to perform matrix multiplication. Discuss the complexity of algorithm used.
2. Write Python program to sort n names using Quick sort algorithm. Discuss the complexity of algorithm used.
3. Write Python program to sort n numbers using Merge sort algorithm. Discuss the complexity of algorithm used.
4. Write Python program for inserting an element into binary tree.
5. Write Python program for deleting an element (assuming data is given) from binary tree.
6. Write Python program for checking whether a given graph G has simple path from source s to destination d. Assume the graph G is represented using adjacent matrix.
7. Write Python program for finding the smallest and largest elements in an array A of size n using Selection algorithm. Discuss Time complexity.
8. Write Python program for finding the second largest element in an array A of size n using Tournament Method. Discuss Time complexity.
9. Write Python program for implementing Huffman Coding Algorithm. Discuss the complexity of algorithm.
10. Write Python program for implementing Strassen's Matrix multiplication using Divide and Conquer method. Discuss the complexity of algorithm.

USCS402: Advanced JAVA

1. Develop the presentation layer of Library Management software application with suitable menus.
2. Design suitable database for Library Management System.
3. Develop business logic layer for Library Management System.
4. Develop Java application to store image in a database as well as retrieve image from database.

5. Write a Java application to demonstrate servlet life cycle.

6. Design database for student administration. Develop servlet(s) to perform CRUD operations.

7. Create Employees table in EMP database. Perform select, insert, update, and delete operations on Employee table using JSP.

8. Write a Student class with three properties. The useBean action declares a JavaBean for use in a JSP. Write Java application to access JavaBeans Properties.

9. Design application using Struts2. Application must accept user name and greet user when command button is pressed.

10. Write Java application to encoding and decoding JSON in Java.

USCS403: Computer Networks

1. Understanding the working of NIC cards, Ethernet/Fast Ethernet/Gigabit Ethernet.

2. Crimping of Twisted-Pair Cable with RJ45connector for Straight-Through, Cross-Over, Roll-Over.

3. To understand their respective role in networks/internet.

4. Problem solving with IPv4, which will include concept of Classful addressing. (supportive Hint: use Cisco Binary Game)

5. Using, linux-terminal or Windows-cmd, execute following networking commands and note the output: *ping, traceroute, netstat, arp, ipconfig.*

6. Using **Packet Tracer**, create a basic network of two computers using appropriate network wire.

7. Using **Packet Tracer**, connect multiple (min.6) computers using layer 2 switch.

8. Using **Packet Tracer**, connect a network in triangular shape with three layer two switches and every switch will have four computer. Verify their connectivity with each other.

9. Using **Packet Tracer**, create a wireless network of multiple PCs using appropriate access point.

10. Using **Wireshark**, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the network analyzer is working.

Evaluation Scheme

I.   Internal Exam - 25 Marks

(i) Test – 20 Marks

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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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