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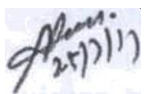
A reference **is invited to** the Syllabi relating to the B.Sc. degree course, <u>vide</u> this office Circular No. UG/42 of 2016-17, dated 5th August , 2016 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by Ad-hoc-Board of Studies Ln Computer 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.
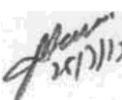
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›>Io. **UG/)bJ- A** of 2017 .M AJ-40*0 032 ২৵ᴴ৲ July, 2017

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

SEMESTER IV

THEORY

Course: USCS404	TOPICS (Credits : 02 Lectures/Week: 03) **Software Engineering**	
Unit I	**Introduction:** The Nature of Software, Software Engineering, The Software Process, Generic Process Model, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Component-Based Development, The Unified Process Phases, Agile Development- Agility, Agile Process, Extreme Programming **Requirement Analysis and System Modeling:** Requirements Engineering, Eliciting Requirements, SRS Validation, Components of SRS, Characteristics of SRS , Object-oriented design using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram, Component diagram, Deployment diagram	15L
Unit II	**System Design:** System/Software Design, Architectural Design, Low-Level Design Coupling and Cohesion, Functional-Oriented Versus The Object-Oriented Approach, Design Specifications, Verification for Design, Monitoring and Control for Design **Software Measurement and Metrics:** Product Metrics – Measures, Metrics, and Indicators, Function-Based Metrics, Metrics for Object-Oriented Design, Operation-Oriented Metrics, User Interface Design Metrics, Metrics for Source Code, Halstead Metrics Applied to Testing, Metrics for Maintenance, Cyclomatic Complexity, Software Measurement - Size-Oriented, Function-Oriented Metrics, Metrics for Software Quality	15L

	Software Project Management: Estimation in Project Planning Process –Software Scope And Feasibility, Resource Estimation, Empirical Estimation Models – COCOMO II, Estimation for Agile Development, The Make/Buy Decision, **Project Scheduling** - Basic Principles, Relationship Between People and Effort, Effort Distribution, Time-Line Charts	
Unit III	**Risk Management** - Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan **Software Quality Assurance:** Elements of SQA, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Six Sigma, Software Reliability, The ISO 9000 Quality Standards, Capability Maturity Model **Software Testing :** Verification and Validation, Introduction to Testing, Testing Principles, Testing Objectives, Test Oracles, Levels of Testing, White-Box Testing/Structural Testing, Functional/Black-Box Testing, Test Plan, Test-Case Design	**15L**

Text book(s):

1) Software Engineering, A Practitioner's Approach, Roger S, Pressman.(2014)

Additional Reference(s):

1) Software Engineering, Ian Sommerville, Pearson Education
2) Software Engineering: Principles and Practices",Deepak Jain,OXFORD University Press,
3) Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI
4) Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley & Sons
5) A Concise Introduction to Software Engineering, Pankaj Jalote, Springer

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

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