UNIVERSITY OF MUMBAI

SYLLABUS OF BRIDGE COURSE IN COMPUTER

SCIENCE

Program: leading to T.Y.B.Sc. In Computer Science.

With effect from
Academic Year 2018-2019

Bridge Course in Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2018-2019

Course	TOPICS	Credits	L / Week
USCSBC201	Paper I	03	03
USCSBC202	Paper II	03	03
USCSBCP201	Practical : USCSBC201 + USCSBC202	02	03

Course: USCSBC201	TOPICS (Credits : 03 Lectures/Week:03) Paper-I	
Unit I	**Automata Theory:** Defining Automaton, Finite Automaton, Transitions and Its properties, Acceptability by Finite Automaton, Nondeterministic Finite State Machines, DFA and NDFA equivalence, Mealy and Moore Machines, Minimizing Automata. **Introduction to Combinatorics:** Enumeration, Combinatorics and Graph Theory/ Number Theory/Geometry and Optimization, Sudoku Puzzles. Strings, Sets, and Binomial Coefficients: Strings- A First Look, Combinations, Combinatorial, The Ubiquitous Nature of Binomial Coefficients, The Binomial, Multinomial Coefficients.	15L
Unit II	**Linear Algebra Using Python** **Field**: Introduction to complex numbers, numbers in Python , Abstracting over fields, Playing with GF(2), Vector Space: Vectors are functions, Vector addition, Scalar-vector multiplication, Combining vector addition and scalar multiplication, Dictionary-based representations of vectors, Dot-product, Solving a triangular system of linear equations. Linear combination, Span, The geometry of sets of vectors, Vector spaces, Linear systems, homogeneous and otherwise.	15L

Unit III	**Network Models:** Introduction to data communication, Components, Data Representation, Data Flow, Networks, Network Criteria, Physical Structures, Network types, Local Area Network, Wide Area Network, Switching, Network Models, Protocol layering, Scenarios, Principles of Protocol Layering, Logical Connections, TCP/IP Protocol Suite, Layered Architecture, Layers in the TCP/IP Protocol Suite. **Introduction to Software Engineering:** 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.	**15L**

Textbook(s):

1. Theory of Computer Science, K. L. P Mishra, Chandrasekharan, PHI,3rd Edition
2. Coding the Matrix Linear Algebra through Applications to Computer Science Edition 1, PHILIP N. KLEIN, Newtonian Press (2013)
3. Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition, TMH, 2013.
4. Software Engineering, A Practitioner's Approach, Roger S, Pressman.(2014)

Additional Reference(s):

1. Theory of Computation, Kavi Mahesh, Wiley India
2. Applied Combinatorics, Sixth.edition, Alan Tucker, Wiley; (2016)
3. Linear Algebra and Probability for Computer Science Applications, Ernest Davis, A K Peters/CRC Press (2012).
4. Computer Network, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition, Pearson Education, 2011.
5. Software Engineering: Principles and Practices",Deepak Jain,OXFORD University Press,

Course: USCSBC 202	TOPICS (Credits : 03 Lectures/Week:03) Paper-II	
Unit I	**Fundamentals of PL/SQL:** Defining variables and constants, PL/SQL Data types: Number Types, Character Types, Boolean Type, Date time and Interval Types. PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, Null Values in Comparisons and Conditional Statements and Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IF THEN-ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, Sequential Control: GOTO and NULL Statements. **Advanced Java: Swing:** Need for swing components, Difference between AWT and swing, Components hierarchy, Panes, Swing components: Jlabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton, JComboBox and JList **JDBC:** Introduction, JDBC Architecture, Types of Drivers, Statement, ResultSet, Read Only ResultSet, Updatable ResultSet, Forward Only ResultSet, Scrollable ResultSet, PreparedStatement.	**15L**
Unit II	**The .NET Framework:**.NET Languages, Common Language Runtime, .NET Class Library. **C# Language Basics:** Comments, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods, Classes, Value Types and Reference Types, Namespaces and Assemblies, Inheritance, Static Members, Casting Objects, Partial Classes **ASP.NET:** Creating Websites, Anatomy of a Web Form - Page Directive, Doctype, Writing Code - Code-Behind Class, Adding Event Handlers, Anatomy of an ASP.NET Application - ASP.NET File Types, ASP.NET Web Folders. **Android:** What is Android? Obtaining the required tools, creating first android app, understanding the components of screen, adapting display orientation, action bar, Activities and Intents, Activity Lifecycle and Saving State, Basic Views: TextView, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView, TimePicker View, DatePicker View, ListView View,	**15L**

	Spinner View	
Unit III	**SoC and Raspberry Pi** **System on Chip:** What is System on chip? Structure of System on Chip. **SoC products:** FPGA**,** GPU, APU, Compute Units. **ARM 8 Architecture:** SoC on ARM 8. ARM 8 Architecture Introduction **Introduction to Raspberry Pi:** Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. **Programming Raspberry Pi** **Raspberry Pi and Linux:** About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands. **Programing interfaces:** Introduction to Node.js, Python. **Useful Implementations:** Cross Compilation, Pulse Width Modulation, SPI for Camera.	**15L**

Textbook(s):

1. Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications
2. Cay S. Horstmann, Gary Cornell, Core Java™ 2: Volume II–Advanced Features Prentice Hall PTR,9th Edition
3. Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress(2012)
4. Beginning Android 4 Application Development, Wei-Meng Lee, March 2012, WROX.
5. Learning Internet of Things, Peter Waher, Packt Publishing(2015)

Additional Reference(s):

1. Joel Murach, Murach's MySQL, Murach
2. *The Java Tutorials: http://docs.oracle.com/javase/tutorial/)*
3. Beginning ASP.NET 4 in C# and VB Imar Spanajaars, WROX
4. https://developers.google.com/training/courses/android-fundamentals
5. Mastering the Raspberry Pi, Warren Gay, Apress(2014)

Course:	(Credits : 02 Lectures/Week: 06)	
USCSBCP201	Practical of USCSBC201 & USCSBC202	

Perform Any 16 practical's

1. Problems on generating languages for given simple grammar.

2. Problems on DFA and NDFA equivalence.

3. Solving problems on strings, sets and binomial coefficients.

4. Solving problems using induction.

5. Write a program which demonstrates the following:

   - Addition of two complex numbers.

   - Displaying the conjugate of a complex number.

   - Plotting a set of complex numbers

   - Creating a new plot by rotating the given number by a degree 90, 180, 270 degrees and also by scaling by a number a=1/2, a=1/3, a=2 etc.

6. Write a program to do the following:

   - Enter a vector u as a n-list

   - Enter another vector v as a n-list

   - Find the vector au+bv for different values of a and b

   - Find the dot product of u and v

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

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

9. Writing PL/SQL Blocks with basic programming constructs by including following:

   a. Sequential Statements b. unconstrained loop

10. Writing PL/SQL Blocks with basic programming constructs by including following:

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

    case statement, While-loop Statements, For-loop Statements

11. Design and develop suitable database and business logic for Library Management System.

12. Develop Java application to store image in a database as well as retrieve image from database.

13. Write C# programs for understanding C# basics involving

   a. Variables and Data Types   b. Object-Based Manipulation

   c. Conditional Logic   d. Loops   e. Methods

14. Create an android app with Interactive User Interface using basic views and Layouts.

15. Create an android app that demonstrates Activity Lifecycle and Instance State.

16. Preparing Raspberry Pi: Hardware preparation and Installation.

17. Linux Commands: Exploring the Raspbian.

18. GPIO: Light the LED with Python & GPIO: LED Grid Module: Program the 8X8 Grid with Different Formulas.

Evaluation Scheme

I. Internal Exam-25 Marks

(i) Test– 20 Marks

20 marks Test – Duration 40 minutes

Weightage per topic should be 5 marks for the test. It will be conducted either using any open source learning management system such as 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 Examination- 75 Marks

(i) Duration - 2.5 Hours.

(ii) Theory question paper pattern:-

All questions are compulsory.

Q.1 Unit I: 20 Marks

Q.2 Unit II: 20 Marks

Q.3 Unit III: 20 Marks

Q.4 Unit I, II and III: 15 Marks

III. Practical Examination – 50 marks

50 Marks: 40 marks + 05 marks (journal) + 05marks (viva)

- Minimum 16 practical are required to be completed and written in the journal.

**Theory and Practical Examination to be conducted at college level

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