**DAYANANDA SAGAR UNIVERSITY**

**SCHOOL OF ENGINEERING**
**DEPARTMENT OF COMPUTER APPLICATIONS**
**SCHEME OF TEACHING AND EXAMINATION 2016 – 2017**

**SEMESTER III** **BRANCH: BCA**

| Sl. No. | Course Code | Course | CR/ AU | No. of hours of Teaching | | | | Scheme of Evaluation | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Continuous | Examination |
| | | | | Lecture | Tutorial | Lab/ Practice | No. of Credits | | |
| 1 | 16CA201 | Computer Networks | CR | 03 | -- | 02 | 04 | 40 | 60 |
| 2 | 16CA202 | Human Computer Interface | CR | 03 | -- | 02 | 04 | 40 | 60 |
| 3 | 16CA203 | Software Engineering | CR | 03 | -- | 02 | 04 | 40 | 60 |
| 4 | 16CA204 | Numerical Methods | CR | 03 | -- | 02 | 04 | 40 | 60 |
| 5 | 16CA205 | Analysis And Design of Algorithms | CR | 03 | -- | -- | 03 | 40 | 60 |
| 6 | 16CA206 | Operating Systems | CR | 03 | -- | - | 03 | 40 | 60 |
| 7 | 16CA271 | Analysis And Design of Algorithms | CR | - | - | 02 | 01 | 20 | 30 |
| 8 | 16CA272 | Operating Systems | CR | - | - | 04 | 02 | 40 | 60 |
| **GRAND Total: 750** | | | | **18** | **--** | **14** | **25** | **300** | **450** |
| 9 | 16CA193 /16CA194 | Kannada | AU | 02 | -- | -- | 02 | 25 | 50 |

Continuous evaluation: 2 IA Tests: 20 Marks, Self-study presentation / survey reports / quiz / assignments / programming exercises: 10 Marks / presentation in seminar and workshops.10 Marks

# Syllabus – 3rd Semester Courses

| Course code: **16CA201** | **COMPUTER NETWORKS** | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | -- | 2 | 4 |
| Course Objectives | The objective is to make the students understand the required functionality at each layer for a given application and trace the flow of information from one node to another node in the network. | | | | |
| Course outcomes | At the end of the course student will be able to<br>• understand the division of network functionalities in to layers,<br>• identify the component required to build different types of networks and<br>• Identify the solution for the functionalities in each layer. | | | | |

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| Module 1 | **INTRODUCTION:** Building a network – network edge and core – layering and protocols - - OSI Reference Model - Network Topologies – Internet Architecture - networking devices – modems, routers, switches, gateways.<br>**DATA COMMUNICATION:** Signal characteristics – Data transmission – Physical links and transmission media – Signal encoding techniques - Channel access techniques – TDM – FDM. | 12 hrs |
| Module 2 | **DATA LINK LAYER AND LAN:** Link layer services – Framing - Error control – flow control – media access control - Ethernet – CSMA/CD – Token Ring - FDDI - Wireless LANs – CSMA/CA. | 08 hrs |
| Module 3 | **NETWORK AND ROUTING:** Circuit switching – packet switching – virtual circuit switching - Routing - IP – Global Address – Datagram Forwarding – Subnetting – CIDR - ARP – DHCP – RIP – OSPF - BGP - ICMP – IPv6. | 10 hrs |
| Module 4 | **TRANSPORT LAYER:** Overview of Transport layer – UDP - TCP – Reliable byte stream – connection management – flow control – retransmission - Congestion control - congestion avoidance. | 08 hrs |
| Module 5 | **APPLICATION LAYER:** Needs/Principles of Application layer Protocols – Web and HTTP – FTP – Electronic Mail (SMTP, POP3, IMAP, MIME) – DNS - SNMP | 07 hrs |

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| Textbooks | 1. Larry L. Peterson and Bruce S. Davie, ”Computer Networks: A systems approach”, Morgan Kaufmann Publishers, USA, 2010.<br>2. James F. Kurose, Keith W. Ross, ”Computer Networking – A Top-Down Approach Featuring the Internet”, Pearson Education, New Delhi, 2009. |
| Reference Books | 1. Prakash C Gupta,” Data Communication and Computer Networks”, Prentice Hall of India, New Delhi, 2009.<br>2. Achyut S Godbole, “Data Communication and Networking”, Tata McGraw Hill Publishing Company, New Delhi, 2007.<br>3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, ”Computer Networks An Open Source Approach “, McGraw Hill Publisher, USA, 2011.<br>4. Andrew S Tanenbaum, David J. Wetherall “Computer Networks”, Prentice Hall of India/ Pearson Education, New Delhi, 2010. |

| Course code: **16CA202** | **HUMAN COMPUTER INTERFACE** | L | T | P | C |
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| | | 3 | - | 02 | 4 |

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| Course Objectives | The objective of the subject is to teach the student to<br>• Learn the foundations of Human Computer Interface<br>• Be familiar with the design technologies for individuals and persons with disabilities<br>• Be aware of mobile HCI<br>• Learn the guidelines for user interface. |
| Course outcomes | At the end the course the students will be able to design the Human Computer Interface. |

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| Module 1 | **FOUNDATIONS OF HCI**<br>The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. | 09 hrs |
| Module 2 | **DESIGN & SOFTWARE PROCESS**<br>Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design. | 09 hrs |
| Module 3 | **MODELS AND THEORIES**<br>Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW. | 09 hrs |
| Module 4 | **MOBILE HCI**<br>Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. | 09 hrs |
| Module 5 | **WEB INTERFACE DESIGN**<br>Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies. | 09 hrs |
| Text Books | 1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)<br>2. Brian Fling, “Mobile Design and Development”, First Edition , O‟Reilly Media Inc., 2009 (UNIT – IV)<br>3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O‟Reilly, 2009.(UNIT-V) | |

| Course code: **16CA 203** | **SOFTWARE ENGINEERING** | L | T | P | C |
|---|---|---|---|---|---|
| | | 03 | -- | 02 | 04 |
| Course Objectives | This course aims at providing an overview over Software Engineering discipline and with insight into the processes of software development. | | | | |
| Course outcomes | At the end of the course student will be able<br>1. To analyse and design of the software development process.<br>2. To understand the testing and maintenance of the software developed process. | | | | |

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| Module 1 | **Definition of terms** - The evolving role of Software – Software characteristics - Software applications - Software Myths.<br>**SOFTWARE PROCESS:** Software process models - The linear sequential model - The prototyping model - The RAD model - Evolutionary software process models - The incremental model - The spiral model - Fourth generation techniques- Agile process. | 10 hrs |
| Module 2 | **SYSTEM ENGINEERING:** Requirements elicitation - Requirements analysis and negotiation - Requirements validation - Requirements management – Joint Application Development – case study. | 07 hrs |
| Module 3 | **ANALYSIS MODELING:** The elements of the analysis model - Data modeling - Data objects, attributes and relationships - Cardinality and modality - Entity/Relationship diagram - Data flow diagrams - The data dictionary - Other classical analysis methods – case study. | 08 hrs |
| Module 4 | **DESIGN CONCEPTS AND PRINCIPLES:** Modularity - Functional Independence - Cohesion-Coupling - Design documentation. Software architecture - Architectural design - Transform centered architecture - Transaction centered architecture – case study. | 08 hrs |
| Module 5 | **SOFTWARE QUALITY ASSURANCE:** Quality concepts – Cost of quality – Software Quality Group (SQA) – Roles and responsibilities of SQA group – Formal Technical reviews **–** Quality standards.<br>**SOFTWARE CONFIGURATION MANAGEMENT:** Baselines - Software configuration items - The SCM process - Version control - Change control - Configuration audit - SCM standards. | 12 hrs |
| Text Book: | 1. Roger S Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition, 2009.<br>2. Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008. | |
| Reference Books | 1. Stephan Schach, Software Engineering, Tata McGraw Hill, 2007<br>2. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, second edition, 2001 | |

| Course code: **16CA204** | **NUMERICAL METHODS** | L | T | P | C |
|---|---|---|---|---|---|
| | | 03 | -- | -- | 04 |
| Course Objectives | The Curriculum supports the prerequisites to enhance their Mathematical knowledge towards their understanding mathematical Concepts and help them to persuade research work in concerned fields with the help of Mathematical approach. | | | | |
| Course outcomes | At the end of the course student will be able to<br>1. Understand and use Eigen values, interpolation and approximation in problem solving.<br>2. use suitable numerical differentiation and integration model for the given scenario/system | | | | |

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| Module 1 | **Mathematical Modeling, Numerical Methods and Problem Solving**<br>A Simple Mathematical Model- Conservation Laws in Engineering and Science- MATLAB Fundamentals.<br>Roots and Optimization-Roots: Bracketing Methods - Open Methods | 09 hrs |
| Module 2 | **Linear Systems**<br>Gauss Elimination - *LU* Factorization- Matrix Inverse and Condition- Iterative Methods | 09 hrs |
| Module 3 | **Curve Fitting**<br>Linear Regression- General Linear Least-Squares and Nonlinear Regression- Fourier Analysis | 09 hrs |
| Module 4 | **NUMERICAL DIFFERENTIATION AND INTEGRATION**<br>Numerical Integration Formulas - Numerical Integration of Functions- Numerical Differentiation. | 09 hrs |
| Module 5 | **Ordinary Differential Equations**<br>Initial-Value Problems - Adaptive Methods and Stiff Systems - Boundary-Value Problems. | 09 hrs |
| Text Book | 1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.<br>2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003<br>3. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.<br>4. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002 | |

| Course code: **16CA205** | **ANALYSIS AND DESIGN OF ALGORITHMS** | L | T | P | C |
|---|---|---|---|---|---|
| | | 03 | 02 | -- | 03 |
| Course Objectives | This subject aims at providing an overview of analysis and design of algorithms. | | | | |
| Course outcomes | At the end of the course student will be able<br>i) Analyse time and space trade-offs of algorithm.<br>ii) Understand the various methods for analysis of algorithms.<br>iii) To apply the suitable algorithm for solving problem. | | | | |

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| Module 1 | **INTRODUCTION:** Definition and properties of algorithms- Recurrence and Non Recurrence algorithm - Analysis of algorithms- Asymptotic notations- Solving recurrence relations- Complexity analysis of Insertion sort, Radix sort, Linear search, finding factorial, binary search - Introduction to NP-Hard and NP-Completeness. | 09 hrs |
| Module 2 | **DIVIDE AND CONQUER:** The general method- Finding Maximum and Minimum Element- Quick sort – Merge sort- Matrix multiplication<br>**GREEDY METHOD:** The general method- Optimal storage on tapes- Knapsack problem- Minimum spanning trees- Single source shortest path method. | 09 hrs |
| Module 3 | Dynamic Programming: The General method- All pairs shortest path- Optimal binary Search tree- Multistage graphs. | 09 hrs |
| Module 4 | B**ACKTRACKING:** The General method- Solution space and tree organization- The Eight Queens problem - Sum of subset problem - Graph coloring - Knapsack problem | 09 hrs |
| Module 5 | **BRANCH AND BOUND:** The General method- LC search – LC branch and Bound – FIFO branch and bound- 0/1 Knapsack problem- Traveling sales person problem- Efficiency consideration | 09 hrs |
| Text Book | 1. Thomas H.Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, “Introduction to Algorithms”, MIT Press, England, 2009. | |
| Reference Books | 1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications, New Delhi, 2010.<br>2. Anany V Levitin, “Introduction to the Design & Analysis of Algorithms”, Prentice Hall of India / Pearson Education, New Delhi, 2008. | |

| Course Code: **16CA206** | **OPERATING SYSTEMS** | L | T | P | C |
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| | | 03 | -- | -- | 03 |
| Course Objectives | The course gives an idea about process synchronization, inter-process communication, scheduling, deadlock handling, and memory management. | | | | |
| Course outcomes | At the end of the course student will be able<br>• Understand the functions of operating system.<br>• Understand the CPU scheduling algorithms and deadlocks.<br>• Understand the storage management and file structures. | | | | |

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| Module 1 | **INTRODUCTION**: Operating system as an extended machine, resource manager. History of OS – first, second, third, fourth, present.<br>Basic operating system concepts – processes, files, shell. (3)<br>**OPERATING SYSTEMS STRUCTURES**: operating system services, user operating system interface, system calls and its types, os design and implementation, virtual machines, debugging, system boot. | 09 hrs |
| Module 2 | **PROCESSES**: Process model – creation, termination, hierarchies, states, implementation. Process synchronization – race conditions, critical sections, mutual exclusion, Peterson's solution, synchronization hardware, semaphores, mutex, monitor, message passing, atomic transactions | 09 hrs |
| Module 3 | **THREADS:** Multithreading models, thread libraries, threading issues, threading in java, classic synchronization problems – dining philosophers and readers writers' problems and its programming solutions.<br>**SCHEDULING:** Batch systems, interactive systems, real time systems, threads. Scheduling criteria, scheduling algorithms, thread and multiprocessor scheduling algorithms, examples and algorithms evaluation. | 09 hrs |
| Module 4 | **DEADLOCKS:** Resources, Principles of deadlock, methods for handling deadlock – ostrich and bankers algorithm, detection and recovery, deadlock prevention, deadlock avoidance.<br>**MEMORY MANAGEMENT:** Main memory – swapping, contiguous memory allocation, paging, structure of page table, segmentation, examples. Virtual memory – demand paging, copy on write, page replacement, allocation of frames, thrashing, memory mapped files, allocating kernel memory, memory management utilities | 09 hrs |
| Module 5 | **VIRTUALIZATION:** Requirements - Type 1 Hypervisors - Type 2 Hypervisors – Para virtualization - Memory Virtualization - I/O Virtualization - Virtual Appliances - Virtual Machines on Multicore CPUs - Licensing Issues (3)<br>**CASE STUDY:** Windows | 09 hrs |
| Text Books | 1. Silberschatz A, Galvin P and Gagne G "Operating Systems Concepts", John Wiley & Sons, USA, 2008.<br>2. Andrew S Tanenbaum, "Operating Systems Design and Implementation", Prentice Hall of India, New Delhi,2006. | |
| Reference Books | 1. Deitel H M, Deitel J P, David R Choffnes, " Operating Systems", Prentice Hall of India, New Delhi, 2004.<br>2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, New Delhi, 2008<br>3. Mark Russinovich, David A. Solomon, Alex Ionescu,"Windows Internals: Including Windows Server 2008 and Windows Vista", Microsoft Press,Cambridge, England, 2009. 4. Gary Nutt, "Operating Systems", Addison Wesley, USA, 2004. | |