# SACRED HEART COLLEGE (AUTONOMOUS)

**Department of Computer Science**

**BSc Computer Applications**

**Course plan**

**Academic Year 2014 - 15**

**Semester III**

## COURSE STRUCTURE

| Title of The Course | No. Hrs./Week | Credits | Total Hrs./Sem |
|---|---|---|---|
| Data Communication and Computer Networks | 4 | 4 | 72 |
| Object Oriented Programming in C++ | 4 | 3 | 72 |
| System Analysis and Design | 4 | 3 | 72 |
| Object Oriented Programming in C++ (Lab) | 3 | 2 | 54 |
| Calculus | 5 | 4 | 90 |
| Probability distribution | 5 | 4 | 90 |

| PROGRAMME | BSC COMPUTER APPLICATIONS | SEMESTER | 3 |
|---|---|---|---|
| COURSE TITLE | DATA COMMUNICATION AND COMPUTER NETWORKS | CREDITS | 4 |
| HOURS/WEEK | 4 | HOURS/SEM | 72 |

**COURSE OBJECTIVES**

➤ To understand the concepts of data communication, types of communication, topology, categories of network, protocols, standards, transmission modes, ISO-OSI and TCP/IP model.

➤ To discuss about analog and digital signals, transmission impairment, transmission modes, transmission media and types of switching.

➤ To discuss different types of error detection and correction methods, types of framing, flow control protocols and random access protocols in data link layer.

➤ To distinguish different types of connecting devices, wired and wireless LAN in network layer.

➤ To discuss about the concepts of mobile computing, cloud computing and IoT.

➤ To discuss about the cyphers used in cryptography.

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
|---------|-------|--------------------|-----------------|---------|
| **MODULE I: INTRODUCTION TO DATA COMMUNICATION** | | | | |
| 1 | Components – Data Representation – Data Flow. Networks | Lecture using PPT | | |
| 2 | Distributed Processing - Network Criteria. Physical Structures: Types of Connection. | Lecture using PPT | | |
| 3 | Physical Topology: Categories of Topologies – Bus – Star – Ring – Mesh. Categories of Networks: LAN – MAN - WAN. | Lecture using PPT | | |
| 4 | Protocols and Standards: Protocols – Standards - Standards Organizations. | Lecture using PPT | Video | |
| 5 | Protocols and Standards: Protocols – Standards - Standards Organizations. | Lecture using PPT | | |
| 6 | Transmission modes: Network models – OSI model – seven layers and their functions in OSI model | Lecture using PPT | e-resource | |
| 7 | Transmission modes: Network models – OSI model – seven layers and their functions in OSI model | Lecture using PPT | | |
| 8 | Transmission modes: Network models – OSI model – seven layers and their functions in OSI model | Lecture using PPT | | |
| 9 | Transmission modes: Network models – OSI model – seven layers and their functions in OSI model | Lecture using PPT | | |
| 10 | TCP/IP protocol suite. | Lecture using PPT | e-resource | |

| | MODEL II: DATA AND SIGNALS | | | |
|---|---|---|---|---|
| 11 | Analog and Digital Data – Analog and Digital Signals– Periodic and Non-Periodic Signals | Lecture using PPT | | |
| 12 | Periodic Analog Signals: Sine Wave - Phase - Wave Length | Lecture using PPT | e-resource | |
| 13 | Time and Frequency Domain – Composite Signals – Bandwidth. | Lecture using PPT | | |
| 14 | Digital Signals: Bit Rate - Bit Length. Transmission. | Lecture using PPT | e-resource | |
| 15 | Impairment: Attenuation - Distortion – Noise | Lecture using PPT | | |
| 16 | Transmission Modes: Parallel Transmission – Serial Transmission. | Lecture using PPT | | |
| 17 | Multiplexing: FDM – TDM | Lecture using PPT | | |
| 18 | Synchronous and Statistical TDM – WDM, Spreading, | Lecture using PPT | e-resource | |
| 19 | Synchronous and Statistical TDM – WDM, Spreading, | Lecture using PPT | | |
| 20 | Transmission Media: Guided Media – Twisted Pair, Coaxial and Fiber Optic | Lecture using PPT | | |
| 21 | Transmission Media: Guided Media – Twisted Pair, Coaxial and Fiber Optic | Lecture using PPT | | |
| 22 | Unguided Media - Radio Waves – Microwaves – Infrared | Lecture using PPT | | |
| 23 | Unguided Media - Radio Waves – Microwaves – Infrared | Lecture using PPT | | |
| 24 | Switching: Circuit Switching - Datagram Network. | Lecture using PPT | | |
| | MODEL III: DATA LINK LAYER | | | |

| | | | |
|---|---|---|---|
| 25 | Error detection and Correction: Types of Errors – | Lecture using PPT | | |
| 26 | Redundancy – Detection versus Correction – Forward Error Correction versus Retransmission | Lecture using PPT | e-resource | |
| 27 | Coding – Modular Arithmetic. Block Coding: Error Detection – Error | Lecture using PPT | | |
| 28 | Correction – Hamming Distance – Minimum Hamming Distance | Lecture using PPT | | |
| 29 | Linear Block Codes: Some Linear Block Code | Lecture using PPT | e-resource | |
| 30 | Cyclic Codes: Cyclic Redundancy Check – Checksum | Lecture using PPT | | |
| 31 | Framing: Fixed Size Framing – Variable Size Framing. | Lecture using PPT | e-resource | |
| 32 | Flow Control: Noiseless Channel Protocol: Simplest Protocol | Lecture using PPT | | |
| 33 | Stop and Wait Protocol. Noisy Channel Protocols: Stop and Wait | Lecture using PPT | | |
| 34 | ARQ – Go Back N ARQ – Selective Repeat ARQ – Piggy Backing | Lecture using PPT | e-resource | |
| 35 | **CIA-1** | | | |
| 36 | Multiple Access: Random Access: | Lecture using PPT | e-resource | |
| 37 | ALOHA – CSMA - CSMA/CD. | Lecture using PPT | e-resource | |
| **MODULE IV: CONNECTING DEVICES** | | | | |
| 38 | Hubs, Switches, Repeaters, Bridges, Routers and Gateway. | Lecture using PPT | | |
| 39 | Network Layer: Host to Host delivery - Logical Addressing | Lecture using PPT | | |

| | | | | |
|---|---|---|---|---|
| 40 | Internet protocol: IPV4 and IPV6 – Address Mapping | Lecture using PPT | | |
| 41 | Internet protocol: IPV4 and IPV6 – Address Mapping | Lecture using PPT | e-resource | |
| 42 | Internet protocol: IPV4 and IPV6 – Address Mapping | Lecture using PPT | | |
| 43 | ICMP – IGMP – Unicasting, Multicasting and Broadcasting. | Lecture using PPT | e-resource | |
| 44 | Wired and Wireless LAN: Wireless WAN-Cellular Telephony and Satellite Networks. | Lecture using PPT | | |
| 45 | Wired and Wireless LAN: Wireless WAN-Cellular Telephony and Satellite Networks. | Lecture using PPT | | |
| 46 | Mobile Computing: Wireless networks: Wireless communication concepts; classification of wireless networks | Lecture using PPT | e-resource | |
| 47 | Cellular networks (1G, 2G, 3G, 4G), WLAN, WPAN, WMAN | Lecture using PPT | | |
| 48 | Cellular networks (1G, 2G, 3G, 4G), WLAN, WPAN, WMAN | Lecture using PPT | | |
| 49 | Satellite Networks, Mobile and Wireless Devices –Need for Mobile Computing | Lecture using PPT | Quiz | |
| 50 | Mobility management: Handoff and location management concepts. | Lecture using PPT | | |
| 51 | Mobility management: Handoff and location management concepts. | Lecture using PPT | | |
| 52 | CIA II | | | |
| MODULE V - TRANSPORT LAYER | | | | |
| 54 | Transport Layer: UDP – TCP | Lecture using PPT | e-resource | |

| | | | | |
|---|---|---|---|---|
| 55 | Application Layer: Name Space – Domain Name Space – Label | Lecture using PPT | | |
| 56 | Domain Name- fully and partially qualified domain names. | Lecture using PPT | Tutorial | |
| 57 | Remote logging - Telnet, FTP, SMTP, and Voice over IP. | Lecture using PPT | e-resource | |
| 58 | Cryptography: Symmetric | Lecture using PPT | | |
| 59 | Cryptography: Symmetric. | Lecture using PPT | | |
| 60 | Cryptography: Symmetric. | Lecture using PPT | | |
| 61 | Cryptography: Asymmetric. | Lecture using PPT | | |
| 62 | Cryptography: Asymmetric. | Lecture using PPT | e-resource | |
| 63 | Cryptography: DES | Lecture using PPT | | |
| 64 | Cryptography: Triple DES | Lecture using PPT | e-resource | |
| 65 | Cryptography: AES | Lecture using PPT | | |
| 66 | Cloud Computing: cloud computing overview, definition and characteristics | Lecture using PPT | | |
| 67 | Grid computing, difference between grid computing and cloud computing | Lecture using PPT | e-resource | |
| 68 | Advantages of cloud computing | Lecture using PPT | | |

| | | | | |
|---|---|---|---|---|
| 69 | Cloud deployment models/types (public, private, hybrid, and community clouds) | Lecture using PPT | | |
| 70 | Cloud service models (IaaS, PaaS, SaaS, BPaas) | Lecture using PPT | e-resource | |
| 71 | Revision | | | |
| 72 | Revision | | | |

## INDIVIDUAL ASSIGNMENTS/SEMINAR – DETAILS & GUIDELINES

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc.) |
|---|---|---|
| 1 | 24.06.2014 | Data Communication, its characteristics, components, data representation, data flow, network criteria, Types of Connection and different topologies. |
| 2 | 24.06.2014 | Physical layer, Data link layer, Network layer, Transport layer, and Session layer of OSI model. |
| 3 | 24.06.2014 | Presentation layer and Application layer of OSI model, TCP/IP protocol and four levels of Addressing of TCP/IP. |
| 4 | 24.06.2014 | Analog signals, digital signals, Periodic and Non-periodic Signals, Sine Wave, Peak Amplitude, Period and Frequency, Phase, Wavelength, Bandwidth, Bit rate, and Bit length. |
| 5 | 24.06.2014 | Transmission impairment, Attenuation and Distortion and Noise. |
| 6 | 24.06.2014 | Multiplexing, Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing and Spread Spectrum. |
| 7 | 24.06.2014 | Transmission Media and Guided Media & Transmission Media and Unguided Media. |

| 8 | 24.06.2014 | Switching: Circuit Switching, Packet Switching, Datagram Networks and Virtual Circuit Networks |
|---|---|---|
| 9 | 24.06.2014 | Types of Errors – Redundancy – Detection versus Correction – Forward Error Correction versus Retransmission – Coding – Modular Arithmetic. |
| 10 | 24.06.2014 | Block Coding: Error Detection – Error Correction – Hamming Distance – Minimum Hamming Distance. |
| 11 | 24.06.2014 | Linear Block Codes: Some Linear Block Code. Cyclic Codes: Cyclic Redundancy Check – Checksum. |
| 12 | 24.06.2014 | Framing: Fixed-size framing,  Variable-size framing, Character-oriented protocol  and Bit-oriented protocol |
| 13 | 24.06.2014 | Flow control, Error control, Simplest protocol, Stop-and-Wait protocol. |
| 14 | 24.06.2014 | Noisy Channels: Stop-and-Wait Automatic Repeat Request, Go-back-N Automatic Repeat Request and Selective Repeat Automatic Repeat Request |
| 15 | 24.06.2014 | Multiple Access: Random Access, ALOHA, Slotted ALOHA, CSMA and CSMA/CD. |
| 16 | 24.06.2014 | Wired LAN, Wireless WAN, Cellular Telephony and Satellite Networks. |
| 17 | 24.06.2014 | Connecting Devices: Hubs, Switches, Repeaters, Bridges, Routers and Gateway. |
| 18 | 24.06.2014 | IPV4 and its packet format. |
| 19 | 24.06.2014 | Advantages of IPV6 than IPV4. |
| 20 | 24.06.2014 | ICMP, IGMP, Multicast Routing Protocols. |
| 21 | 24.06.2014 | Wireless WAN-Cellular Telephony and Satellite Networks |
| 22 | 24.06.2014 | Wireless networks: Wireless communication concepts; classification of wireless networks. |
| 23 | 24.06.2014 | Cellular networks (1G, 2G, 3G, 4G), WLAN, WPAN, WMAN, Satellite Networks |

| | | |
|---|---|---|
| 24 | 24.06.2014 | Mobile and Wireless Devices –Need for Mobile Computing, Mobility management: Handoff and location management concepts, |
| 25 | 24.06.2014 | Transport Layer: UDP – TCP. |
| 26 | 24.06.2014 | Explain congestion control. Define Open loop. |
| 27 | 24.06.2014 | Explain congestion control. Define closed loop. |
| 28 | 24.06.2014 | Application Layer: Name Space – Domain Name Space – Label, Domain Name- fully and partially qualified domain names |
| 29 | 24.06.2014 | Remote logging - Telnet, FTP, SMTP, and Voice over IP. |
| 30 | 24.06.2014 | Cryptography, its components and its categories. |
| 31 | 24.06.2014 | All traditional cyphers. |
| 32 | 24.06.2014 | All simple modern cyphers. |
| 33 | 24.06.2014 | All modern round cyphers. |
| 34 | 24.06.2014 | Cloud Computing: cloud computing overview, definition and characteristics, grid computing, difference between grid computing and cloud computing, advantages of cloud computing |
| 35 | 24.06.2014 | Cloud service models/types (public, private, hybrid, and community clouds), cloud deployment models (IaaS, PaaS, SaaS, BPaaS) |

## GROUP ASSIGNMENTS/ACTIVITES – DETAILS & GUIDELINES

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc.) |
|---|---|---|
| 1 | 24.06.2014 | Applications of IoT in Real Time Applications |

**REFERENCES**

- Behrouz and Forouzan - Introduction to Data Communication and Networking - 4th Edition - TMH-2000
- Mobile ComputingTechnology, Applications, and Service Creation by Asoke K Talukder, RoopaYavagal – 1st Edition - McGraw-Hill - 2007
- Cloud Computing By Saurabh K, 2nd Edition - Wiley India Pvt. Ltd.-New Delhi,

**WEB RESOURCE REFERENCES:**

- https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm

**COURSE PLAN 2 :   OBJECT ORIENTED PROGRAMMING IN C++**

| PROGRAMME | BSC.COMPUTER APPLICATIONS | SEMESTER | 2 |
|---|---|---|---|
| COURSE TITLE | OBJECT ORIENTED PROGRAMMING IN C++ | CREDIT | 3 |
| HOURS/WEEK | 4 | HOURS/SEM | 72 |

**COURSE OBJECTIVES**

➢ To outline the essential features and elements of the C++ programming language.

➢ To explain programming fundamentals, including statement and control flow and recursion.

➢ To apply the concepts of class, method, constructor, data abstraction, function abstraction, inheritance, overloading, and polymorphism

➢ To understand the concept of streams

➢ To understand the concept of exception handling

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
|---|---|---|---|---|
| | MODULE I | | | |
| 1 | Introductory Session | PPT | video | |
| 2 | Basic concept of object oriented programming | PPT/Lecture | | |
| 3 | benefits of oops | PPT/Lecture | | |
| 4 | Structure of C++ Program | Lecture | e-resource | |
| 5 | Basic, derived and user defined data types | Lecture | e-resource | |
| 6 | Basic, derived and user defined data types | Lecture | e-resource | |
| 7 | Symbolic constants | Lecture | e-resource | |

| | | | | |
|---|---|---|---|---|
| 8 | operators in C++ | Lecture | e-resource | |
| 9 | Control Structures | Lecture | e-resource | |
| 10 | Control Structures | Lecture | e-resource | |
| 11 | Functions in C+ | PPT/Lecture | | |
| 12 | The main function, function prototyping | PPT/Lecture | | |
| 13 | call by reference | PPT/Lecture | | |
| 14 | return by reference | Lecture | | |
| | **MODULE II** | | | |
| 15 | inline function | PPT/Lecture | | |
| 16 | friend functions | Lecture | | |
| 17 | specifying a class | Lecture | | |
| 18 | Defining member functions | Lecture | | |
| 19 | Nesting of member functions | Lecture | | |
| 20 | Private member functions - arrays within a class | PPT/Lecture | | |
| 21 | static data members | PPT/Lecture | | |
| 22 | static member functions | PPT/Lecture | | |
| 23 | Arrays of objects | PPT/Lecture | | |
| 24 | objects as function arguments | Lecture | | |
| 25 | Pass by value and pass by reference | Lecture | | |
| | **CIA-1** | | | |
| | | | | |
| 27 | Nested Class | Lecture | | |
| 28 | Constructors | Lecture | | |
| 29 | Parameterized Constructors | PPT/Lecture | | |

| 30 | Multiple constructors - Copy constructor | PPT/Lecture | | |
|---|---|---|---|---|
| 31 | Dynamic constructor | PPT/Lecture | | |
| 32 | Destructors | | | |
| | **MODULE III** | | | |
| 33 | Operator overloading | PPT/Lecture | | |
| 34 | Unary Operator overloading | PPT/Lecture | | |
| 35 | binary Operator overloading | PPT/Lecture | | |
| 36 | Operator overloading with friend functions | Lecture | | |
| 37 | Type conversions | Lecture | Q & Ans Session | |
| 38 | Inheritance:  private, public, protected inheritance | PPT/Lecture | | |
| 39 | Single inheritance | PPT/Lecture | | |
| 40 | Multiple inheritance | PPT/Lecture | | |
| 41 | Multilevel inheritance | PPT/Lecture | | |
| 42 | Hierarchical inheritance | Lecture | | |
| 43 | Hybrid inheritance | PPT/Lecture | | |
| 44 | virtual base classes | PPT/Lecture | | |
| 45 | Abstract classes | PPT/Lecture | | |
| 46 | Constructors in derived classes | PPT/Lecture | | |
| 47 | nesting of classes. | PPT/Lecture | | |
| | **MODULE IV** | | | |
| 48 | Pointers | PPT/Lecture | | |
| 49 | this pointer | PPT/Lecture | | |
| 50 | Polymorphism | PPT/Lecture | | |
| 51 | Pointers to objects | PPT/Lecture | | |

| 52 | pointer to derived classes | PPT/Lecture | Video | |
|---|---|---|---|---|
| 53 | virtual functions | PPT/Lecture | | |
| 54 | Pure virtual functions | PPT/Lecture | | |
| 55 | C++ streams | Lecture | | |
| 56 | Stream classes-Unformatted | Lecture | Debate | |
| 57 | console I/O operations | PPT/Lecture | | |
| 58 | Managing output with manipulators | PPT/Lecture | | |
| 59 | Manipulating strings | PPT/Lecture | | |
| 60 | Stream classes-formatted | PPT/Lecture | | |
| 61 | programs using manipulators | PPT/Lecture | | |
| 62 | Revision | PPT/Lecture | | |
| **CIA - II** | | | | |
| **MODULE V** | | | | |
| 63 | Exception Handling | Lecture | Demo video | |
| 64 | principle of Exception handling | Lecture | | |
| 65 | Exception handling mechanism | Lecture | Group discussion | |
| 66 | try-catch | Lecture | | |
| 67 | multiple catch | PPT/Lecture | | |
| 68 | Nested try | PPT/Lecture | | |
| 69 | Rethrowing the exception | PPT/Lecture | | |
| 70 | Revision | | | |
| 71 | Revision | | | |
| 72 | Revision | | | |

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 10/08/2014 | OOP concepts and basics of C++ |
| 2 | 8/08/2014 | Program using Constructors |

**GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines**

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| **1** | 18/09/2014 | Programs using Inheritance |

**References**

- James Rumbaugh, Michael Blaha -2007-Object Oriented Modeling and Design with UML Second Edition-Pearson Education

- E. Balaguruswamy - Object oriented Programming with C++ Fourth edition –McGraw Hill

- Yashwant Kanetkar – 2001 Let Us C++Second Edition -  BPB Publications

- John R Hubbard -2004-Programming with C++ (Shaum's Outline series) Second Edition- McGraw Hill

**Web resource references:**

- https://www.tutorialspoint.com/cplusplus/index.htm
- https://www.javatpoint.com/cpp-tutorial

**COURSE PLAN 3: SYSTEM ANALYSIS AND DESIGN**

| PROGRAMME | BSC COMPUTER APPLICATIONS | SEMESTER | 3 |
|---|---|---|---|
| COURSE TITLE | SYSTEM ANALYSIS AND DESIGN | CREDITS | 3 |
| HOURS/WEEK | 4 | HOURS/SEM | 72 |

**COURSE OBJECTIVES**

➤ To apply the software development life cycle model to a development project.

➤ To collect and analyse user requirements.

➤ To understand the principles of systems analysis and design\

➤ To able to carry out a structured analysis of business systems requirements

➤ To able to design business systems solutions.

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
|---|---|---|---|---|
| MODULE 1 | | | | |
| 1. | Introduction | | | |
| 2. | Syllabus discussion | Lecture | | |
| 3. | System and its concepts | PPT/Lecture | | |
| 4. | Elements of system | PPT/Lecture | | |
| 5. | Characteristics of system | PPT/Lecture | | |
| 6. | Information systems concepts | PPT/Lecture | | |
| 7. | Business information systems | PPT/Lecture | | |

| | | | | |
|---|---|---|---|---|
| 8. | Describing the business organization | PPT/Lecture | | |
| 9. | organization chart , organization function list | PPT/Lecture | | |
| 10. | information system levels - operational, lower, middle, top management | PPT/Lecture | | |
| 11. | the system development life cycle concepts | PPT/Lecture | | |
| 12. | Hardware and software end products. | PPT/Lecture | | |
| 13. | Life cycle activities- life cycle flow chart, task | PPT/Lecture | | |
| 14. | Management review, baseline specifications | PPT/Lecture | | |
| 15. | Role of system analyst | PPT/Lecture | | |
| | **MODULE 2** | | | |
| 16. | Basic tool of system analysis identification codes – definition, need for codes | Lecture | | |
| 17. | code plan, code dictionary | Lecture | | |
| 18. | common type of codes | Lecture | | |
| 19. | Notes Preparation | | | |
| 20. | forms design | PPT/Lecture | | |
| 21. | basic parts of form | Lecture | | |
| 22. | style and types of form, principles of form design | PPT/Lecture | | |
| 23. | REVISION | PPT/Lecture | | |

| | | | | |
|---|---|---|---|---|
| 24. | Tools for structure analysis and design: Types of basic charts | PPT/Lecture | | |
| 25. | decision tables | PPT/Lecture | | |
| 26. | decision trees | PPT/Lecture | | |
| 27. | structured English | PPT/Lecture | | |
| 28. | data flow diagram | Lecture | | |
| 29. | data flow diagram example | Lecture | | |
| 30. | data dictionary | PPT/Lecture | | |
| 31. | CIA I | PPT/Lecture | | |
| 32. | Discussion on CIA | PPT/Lecture | | |
| 33. | system flow charts | PPT/Lecture | | |
| 34. | flow charting symbols | PPT/Lecture | | |
| 35. | information oriented flow charts | PPT/Lecture | | |
| 36. | process oriented flow charts, HIPO | PPT/Lecture | | |
| **MODULE 3** | | | | |
| 37. | Study phase: Study phase activities | PPT/Lecture | | |
| 38. | information service request | PPT/Lecture | | |
| 39. | initial investigation | PPT/Lecture | | |
| 40. | fact finding techniques | PPT/Lecture | Demo video | |
| 41. | fact finding techniques | PPT/Lecture | | |
| 42. | fact analysis techniques | PPT/Lecture | | |
| 43. | fact analysis techniques | PPT/Lecture | | |
| 44. | steps in feasibility analysis | PPT/Lecture | | |
| 45. | steps in feasibility analysis | PPT/Lecture | | |
| 46. | study phase report | Lecture | | |

| | | | | |
|---|---|---|---|---|
| 47. | Revision | Seminar | | |
| 48. | Revision | seminar | | |
| **MODULE 4** | | | | |
| 49. | Design phase: Design phase activities | Lecture | | |
| 50. | structure design input design- input data | PPT/Lecture | | |
| 51. | input media and devices | PPT/Lecture | | |
| 52. | Output design | Lecture | | |
| 53. | design phase report | Lecture | | |
| 54. | Revision | Seminar | | |
| 55. | CIA II | | | |
| 56. | Answer discussion | Lecture | | |
| 59 | Development phase: Development phase activities | Seminar | | |
| 60 | Bottom up approach | Seminar | | |
| 61. | Top down approach | Seminar | | |
| 62 - 63. | computer program development | Seminar | | |
| **MODULE 5** | | | | |
| 64. | training- programmer, operator, user trainings | Lecture | | |
| 65. | convertion; change over plan, PERT | Lecture | | |
| 66. | steps in computer program development; | Lecture | | |
| 67 | structured programming, *development phase report* | PPT/Lecture | | |

| | | | | | |
|---|---|---|---|---|---|
| 68 | *SoftwareEngineering:* Introduction ,Role and Nature of Software, Software Terminologies | PPT/Lecture | | | |
| 69 | Role of Management in Software Development. Software Life Cycle Models – Build and Fix Model, Water Fall Model, | PPT/Lecture | | | |
| 70. | Prototyping Model, RAD Model, Spiral Model, Iterative Enhancement Model, | PPT/Lecture | | | |
| 71. | The Unified Process, Selection of a Life Cycle Model. | PPT/Lecture | | | |
| 72. | Previous year question paper discussion | | | | |

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

| Sl.No | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 15/7/14 | SDLC Life Cycle |

**Books of study:**

- Elements of System Analysis by Marvin Gore & John Stubbe, Galgotia Book Source
- Text book of software engineering by Kumudini Manwar & Manisha Kumbhar

**References:**

- System Analysis and Design by Elias M Awad, Galgotia Book Source
- Software Engineering Concepts by Richard Fairley, Tata McGraw Publication

## COURSE 4 - CALCULUS

| PROGRAMME | BSC COMPUTER APPLICATION | SEMESTER | 3 |
|---|---|---|---|
| COURSE TITLE | CALCULUS | CREDIT | 4 |
| HOURS/WEEK | 5 | HOURS/SEM | 90 |

## COURSE OBJECTIVES

➢ To find the higher order derivative of the product of two functions and its applications

➢ To expand a function using Taylor's and Maclaurin's series.

➢ To conceive the concept of asymptotes and obtain their equations.

➢ To apply the concept of partial derivatives.

➢ To find the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form and find the area and volume by applying the techniques of double and triple integrals.

➢ To find the area and volume by applying the techniques of double and triple integrals

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
|---|---|---|---|---|
| MODULE 1 | | | | |
| 1 | Introduction | Lecture | | |
| 2 | Successive Differentiation | Lecture& PPT | | |
| 3 | Nth derivative | Lecture | | |
| 4 | problems | discussion | | |
| 5 | Leibnitz theorem | Lecture | | |
| 6 | problems | discussion | | |

| 7 | More problems | discussion | | |
|---|---|---|---|---|
| 8 | Expansion of functions using Maclaurin's theorem | Lecture | Video | |
| 9 | problems | discussion | | |
| 10 | Expansion of functions using Taylor's theorem | Lecture | | |
| | problems | discussion | | |
| 11 | Concavity | Lecture | Video | |
| 12 | problems | discussion | | |
| 13 | points of inflexion | Lecture | | |
| 14 | problems | discussion | | |
| 15 | Curvature | Lecture | | |
| 16 | problems | discussion | | |
| 17 | Evolutes | Lecture | | |
| 18 | Length of arc as a function derivatives of arc | Lecture | | |
| 19 | problems | discussion | | |
| 20 | Radius of curvature – Cartesian equations. | Lecture | | |
| 21 | problems | discussion | | |
| 22 | Centre of curvature | Lecture | | |
| 23 | problems | discussion | | |
| 24 | Evolutes | Lecture | | |
| 25 | problems | discussion | | |
| 26 | Involutes | Lecture | | |

| 27 | problems | discussion | | |
|----|----------|------------|--|--|
| 28 | properties of evolutes | Lecture | | |
| 29 | problems | discussion | | |
| 30 | Asymptotes | Lecture& PPT | | |
| 31 | problems | discussion | | |
| 32 | Envelopes | Lecture | | |
| 33 | problems | discussion | | |
| 34 | Extra problems | discussion | | |
| 35 | Revision | Discussion | | |
| **MODULE 2** | | | | |
| 36 | Introduction | Lecture | | |
| 37 | Partial derivatives | Lecture | | |
| 38 | PROBLEMS | Discussion | | |
| 39 | The chain rule | Lecture | | |
| 40 | PROBLEMS | Discussion | | |
| 41 | Chain rule for three independent variables | Lecture | | |
| 42 | PROBLEMS | Discussion | | |
| 43 | Extreme values | Lecture | Video | |
| 44 | PROBLEMS | Discussion | | |
| 45 | saddle points | Lecture | | |
| 46 | PROBLEMS | Discussion | | |
| 47 | Lagrange multipliers | Lecture& PPT | | |
| 48 | PROBLEMS | Discussion | | |
| 49 | Legranges multipliers with two constraints | Lecture& PPT | | |

| | | | | |
|---|---|---|---|---|
| 50 | PROBLEMS | Discussion | | |
| 51 | Partial derivatives with constrained variables | Lecture | | |
| 52 | problems | Discussion | | |
| 53 | Extra problems | Discussion | | |
| 54 | Revision | Discussion | | |
| 55 | Revision | Discussion | | |
| 56 | CIA -1 | | | |
| 57 | Answer discussion | | | |
| MODULE 2 | | | | |
| 58 | introduction | Lecture | | |
| 59 | Substitution | Lecture | | |
| 60 | problems | Discussion | | |
| 61 | Area between curves | Lecture | | |
| 62 | problems | Discussion | | |
| 63 | Volumes by Slicing | Lecture& PPT | Video | |
| 64 | problems | Discussion | | |
| 65 | rotation about an axis | Lecture | | |
| 66 | Volume by disk method | Lecture&ppt | | |
| 67 | problems | Discussion | | |
| 68 | Volume by washer method | Lecture&ppt | | |
| 69 | problems | Discussion | | |
| 70 | Volumes by cylindrical shells | Lecture& PPT | | |
| 71 | problems | Discussion | | |

| 72 | Lengths of Plane Curves | Lecture | | |
|---|---|---|---|---|
| 73 | problems | Discussion | | |
| 74 | Areas of surfaces of Revolution | Lecture& PPT | | |
| 75 | problems | Discussion | | |
| 76 | The theorems of Pappus | Lecture | | |
| 77 | Problems | Discussion | | |
| 78 | Revision | Discussion | | |
| | **MODULE 4** | | | |
| 79 | Introduction | Discussion | | |
| 80 | Double integrals | Lecture | | |
| 81 | Areas | Lecture& PPT | | |
| 82 | **CIA-2** | | | |
| 83 | Double integrals in polar form | Lecture | | |
| 84 | problems | Discussion | | |
| 85 | Triple integrals in rectangular coordinates | Lecture& PPT | Video | |
| 86 | problems | Discussion | | |
| 87 | Triple integrals in cylindrical and spherical coordinates | Lecture& PPT | Video | |
| 88 | problems | Discussion | | |
| 89 | Substitutions in multiple integrals | Lecture& PPT | | |
| 90 | Revision | Discussion | | |

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc.) |
|---|---|---|
| 1 | 15/7/2014 | Problems on Centre of curvature, Evolutes and Involutes, Asymptotes and Envelopes. |
| 2 | 5/8/2014 | Problems on extreme values ,saddle points and Lagrange multipliers |
| 3 | 30/8/2014 | Problems on volumes by Slicing and rotation about an axis and volumes by cylindrical shells |
| 4 | 15/9/2014 | Problems on Triple integrals in cylindrical and spherical coordinates and substitutions in multiple integrals. |

## TEXT BOOKS & REFERNCES

- George B. Thomas Jr. (Eleventh Edition ) – Thomas' Calculus, Pearson, 2008.
- Shanti Narayan and P. K. Mittal– Differential Calculus ( S. Chand & Co.) 2008

**COURSE 5-: PROBABILITY DISTRIBUTIONS**

| PROGRAMME | BACHELOR OF COMPUTER APPLICATIONS | SEMESTER | 3 |
|---|---|---|---|
| COURSE TITLE | PROBABILITY DISTRIBUTIONS | CREDIT | 4 |
| HOURS/WEEK | 5 | HOURS/SEM | 90 |

**COURSE OBJECTIVES**

➢ To understand and apply mathematical expectations-moments,moment generating functions

➢ To understand conditional expectation ,Cauchy Schwartz inequality

➢ To understand the concepts of probability distributions and their properties

➢ To understand -Normal, Standard normal and Lognormal distributions

➢ To understand lack of memory property, Normal distributions

➢ To understand Tchedycheff's inequality,Bernoulli's law of large numbers

➢ To know methods of sampling

➢ To understand sampling distributions, standard error

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
|---|---|---|---|---|
|  |  |  |  |  |
| 1 | Bridge course | Lecture |  |  |
| 2 | Introduction to mathematical expectation | Lecture | e-resource |  |
| 3 | Mathematical Expectation-, and its properties, | Lecture |  |  |
| 4 | Moment generating functions(m.g.f.) | PPT/Lecture |  |  |
| 5 | Properties of Moment generating | PPT/Lecture |  |  |

| | | functions(m.g.f.) | | | |
|---|---|---|---|---|---|
| 6 | | Characteristic function | PPT/Lecture | | |
| 7 | | Conditional expectation | Lecture | | |
| 8 | | Cauchy Schwartz inequality | PPT/Lecture | | |
| 9 | | Bivariate moments, | PPT/Lecture | | |
| 10 | | Correlation between two random variables | Lecture | | |
| 11 | | Class test | Lecture | | |
| 12 | | Introduction to probability | Lecture | | |
| 13 | | Uniform distribution (Discrete ) | PPT/Lecture | | |
| 14 | | Bernoulli Distribution | Lecture | | |
| 15 | | Example problems on Bernoulli distribution | PPT/Lecture | | |
| 16 | | Geometric distribution | Lecture | | |
| 17 | | Properties of  Geometric distribution | Lecture | | |
| 18 | | Exponential distribution | Lecture | | |
| 19 | | characteristics | Lecture | | |
| 20 | | problems | Lecture | | |
| 21 | | Gamma distribution | PPT/Lecture | | |
| 22 | | Properties | PPT/Lecture | | |
| 23 | | problems | Lecture | | |
| 24 | | CIA I | | | |
| 25 | | Beta distribution | Lecture | | |
| 26 | | Extra problems | PPT/Lecture | | |
| 27 | | Binomial distribution | PPT/Lecture | | |
| 28 | | Poisson distribution | PPT/Lecture | | |

| 29 | Lack of memory property(LMP | Lecture | Quiz | |
|---|---|---|---|---|
| 30 | fitting of binomial distributions | PPT/Lecture | | |
| 31 | Fitting problems | PPT/Lecture | | |
| 32 | Fitting of Poission Distribution | PPT/Lecture | | |
| 33 | Fitting problems | PPT/Lecture | | |
| 34 | Normal distribution | Lecture | | |
| 35 | properties | Lecture | | |
| 36 | Mean , median, mode of normal | PPT/Lecture | | |
| 37 | Moment generating function of normal distribution | PPT/Lecture | | |
| 38 | Standard normal distribution | PPT/Lecture | | |
| 39 | Fitting of Normal distribution | PPT/Lecture | | |
| 40 | problems | Lecture | | |
| 41 | problems | Lecture | | |
| 42 | Class test | | | |
| 43 | Tchebycheff's inequality | PPT/Lecture | | |
| 44 | Bernoulli's law of large numbers, | Lecture | | |
| 45 | Weak law of large numbers | Lecture | | |
| 46 | Central limit theorem (Lindberg Levy form with proof) | Lecture | | |
| 47 | Limiting distributions of binomial and Poisson distributions | Lecture | | |
| 48 | Methods of sampling – Simple random sampling | Lecture | | |
| 49 | systematic sampling and stratified sampling | Lecture | | |
| 50 | Statistic and Parameter | Lecture | | |

| | | | | |
|---|---|---|---|---|
| 51 | problems | Lecture | | |
| 52 | CIA II | | | |
| 53 | Sampling distributions, standard error | Lecture | | |
| 54 | Sampling distribution of mean and Variance | Lecture | | |
| 55 | Chi-square | Lecture | | |
| 56 | Properties and problems | Lecture | | |
| 57 | Student's t distribution | Lecture | | |
| 58 | properties | Lecture | | |
| 59 | F  distribution | Lecture | | |
| 60 | properties | Lecture | | |
| 61 | Interrelations | Lecture | | |
| 62 | problems | Lecture | | |
| 63 | Revision | Lecture | | |
| 64 | Question paper discussion | Lecture | | |
| 65 | Test paper | Lecture | | |
| 66 – 78 | Seminar and presentations | | | |
| 79 – 90 | Revision | | | |

### INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

| | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|
| 1 | Problems ON  CORRELATION COEFFICIENT |
| 2 | Problems using PROBABILITY AND BAYES THEOREM |

### REFERENCES:

1. S.P.GUPTA   - STATISTICAL METHODS

2. S.C.GUPTA , V.K.KAPOOR  -  FUNDAMENTALS OF MATHEMATICAL STATISTICS

3. B.L.AGARWAL - BASIC STATISTICS