Master of Computer Application

FLEXILEARN
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Programme Structure

Curriculum & Scheme of Examination

2015

AMITY UNIVERSITY
CHHATTISGARH

RAIPUR

MCA

Programme Structure

FOURTH SEMESTER

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
IFT4401	Software Engineering	3	-	-	3
IFT4402	Internet & Java Programming	3	-	-	3
IFT4409	Routing Protocols and Concepts	3	-	-	3
IFT4413	Open Source Technologies	3	-	-	3
IFT4414	Fundamentals of E-Commerce & ERP	3	-	-	3
	Elective-I: Select any one:	3	1	-	4
IFT4406 IFT4415 IFT4408	Parallel Processing Mobile Computing Advanced Computer Architecture				
IFT4416	Open Source Technologies Lab	-	-	2	1
IFT4411	Internet & Java Programming Lab	-	-	4	2
IFT4412	Routing Protocols and Concepts Lab	-	-	2	1
Open Electives					4
CSS4451	Cross Cultural Communication*	1	-	-	1
BEH4451	Professional Excellence*	1	-	-	1
LAN4451 LAN4452 LAN4453 LAN4454 LAN4455 LAN4456 LAN4457 LAN4458	Foreign Business Language - IV French -IV German -IV Spanish -IV Russian -IV Chinese -IV Portuguese –IV Korean-IV Japanese-IV	2	-	-	2
	TOTAL				**27**

SUMMER PROJECT – II

SOFTWARE ENGINEERING

Course Code: IFT4401 Credit Units: 03

Course Objective:
Students in this course should be able to explain and apply a broad range of concepts from software engineering, spanning all aspects the software engineering process. They should be able to recognize, define, and make correct use of generally accepted software engineering terminology.

Course Contents:
Module I: Introduction
Evolution of Software Engineering, Software Problems, Issues Involved In Software Engineering, Fundamental Qualities of a Software Product, Approaches to Software Engineering, Planning the development Process

Module II: Software Life Cycle Models
Development/Product Life-Cycle Model, Kinds of Software Life-Cycle Model Project Management Concepts, Project Management Activities

Module III: Software Requirement Specification
Requirement Engineering, Requirement elicitation, Requirement analysis, requirement documentation, Case Study.

Module IV: Software Project Planning
Size Estimation, Cost Estimation, Models, COCOMO, Software Risk Management.

Module V: Software Design
Software Designing Principles, cohesion and its type, Various Strategies, Module Level Concepts, Structured Design Methodologies, coupling and its types.

Module VI: Software Metrics
Software Metrics, function count, Data Structure Metrics, Information Flow Metrics and Metrics analysis.

Module VII: Software Reliability
Basic Concepts, Software quality, software reliability models, Capability maturity models, ISO 9000, quality, quality standard.

Module VIII: Software Testing
Testing Process, Terminology and error bug, Fault, failure & defeit, Functional Testing, equivalence partitioning, boundery value analysis, Structural Testing, Basis path testing, cyclomation complexity, cause & effect, desire table, Levels of Testing, Debugging and Testing Tools.

Module IX: Software Maintenance
Maintenance Process, Maintenance Model, Estimation of maintenance cost, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management and Documentation.

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	10	15	5	70

Text & References:
Text:
- Software Engineering, A Practitioner's Approach, Roger S. Pressman,
- Software Engineering, K.K. Agarwal, Yogesh Singh, New Age International Publishers
- An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa Publication
References:
- Software Engineering Concepts, Richard Fairley

INTERNET AND JAVA PROGRAMMING

Course Code: IFT4402 Credit Units: 03

Course Objective:
This course will introduce the essential topics of Internet Programming predominately with the Java programming language. Students will design and write interactive WWW pages using Java, HTML, CGI, VRML programming languages. Students will develop software that manipulates different forms of data such as hypertext, graphics, video, and sound. Advanced interactive/executable web pages will be developed.

Course Contents:

Module I: Introduction
Basics of computer communication, OSI Model of ISO, LAN, WAN, Internet, Evolution of Internet, Internet Applications, TCP/IP, Introduction to RFC, Addressing in Internet – IP and Domains, Internet Service Providers.

Module II: HTML
Document Overview, Header Element, Lists Hypertext Links, Visual Markup, URLs
Images, Forms, Tables, Special Characters

Module III:Introduction to JAVA Programming
Introduction to Java, Java features, An Overview of Java, Data Types, Variables, Arrays, Operators, and Control Statements.

Module IV: Java with Object Orientated Features
Introducing Classes, A Closer look at Methods and Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O, and Applets, Creating threads, implementing threads, threads priorities, suspending, stopping & resuming threads.

Module V:The Java Library
String Handling, Event Handling Mechanism, Events, classes, sources of events, Networking, and Event Handling & Event Delegation model, Event listener interfaces.

Module VI: GUI in Java
Introducing the AWT: AWT Controls, Working with Windows, Layout Managers, and working with Swing.

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	10	15	5	70

Text & References:

Text:
- Patrick Naughtn and Herbert Schildt The Complete Reference, Java 2, TMH
- Douglas E.Cmer, Computer Networks & Internet, Pearson.

References:
- The Internet :By- Douglas E.Cmer: TMH

ROUTING PROTOCOLS AND CONCEPTS

Course Code: IFT4409Credit Units: 03

Course Objective:
The goal of CCNA Exploration Routing Protocols and Concepts course is to develop an understanding of how a router learns about remote networks and determines the best path to those networks. This course includes both static routing and dynamic routing protocols.

Course Contents:

Module I: Intro to Routing and Packet Forwarding
Introduction, Inside the Router, CLI Configuration and Addressing, Building the Routing Tables, Path Determination and Switching Functions.

Module II: Static Routing
Introduction, Routers and Network, Router Configuration Review, Exploring Directly Connected Networks, Static Routes with "Next Hop" , Addresses ,Static Routes with Exit Interface, Summary and Default Static Routes, Managing and Troubleshooting Static Routes.

Module III: Introduction to Dynamic Routing Protocols
Introduction, Classifying Dynamic Routing Protocols, Metrics, Administrative Distance, Routing Protocols and Subneting Activities.

Module IV: Distance Vector Routing Protocols
Introduction to Distance Vector Routing Protocols, Network Discovery, Routing Table Maintenance, Routing Loops, Distance Vector Routing Protocols Today.

Module V: RIP Version - I
Introduction, RIP v1,Distance Vector, Classful Routing Protocols, Basic RIPv1 Configuration, Verification and Troubleshooting, Automatic Summarization, Default Route and RIP v1.

Module VI: VLSM and CIDR
Introduction, Classful and Classless Addressing, VLSM, CIDR, VLSM and Route Summarization Activity.

Module VII: RIP Version - II
Introduction, RIPv1 Limitations, Configuration RIPv2, VLSM & CIDR, Verifying & Troubleshooting RIPv2.

Module VIII: The Routing Table – A Close Look
Introduction, the Routing Table Structure, Routing Table Lookup Process, Routing Behaviour.

Module IX: EIGRP
Introduction to EIGRP, Basic EIGRP Configuration, EIGRP Metric Calculation, DUAL, More EIGRP Configuration.

Module X: Link State Routing Protocols
Introduction, Link State Routing, Implementing Link State Routing Protocols.

Module XI: OSPF
Introduction to OSPF, Basic OSPF Configuration, The OSPF metric, OSPF and Multi-access Networks, More OSPF Configuration.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	10	15	5	70

Text & References:

Text
- Cisco Networking Academy Programme CCNA 1 & 2 Companion Guide, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 1 & 2 Lab Companion, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 1 & 2 Engineering General, 3rd Edn by Pearson Education
- CISCO CCNA-Exploration 4.0, Module 2, Pearson Education.

References:
- Data Communications and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tane nbaum, 4e, Pearson Education

Note: This is an online course of Cisco. Online materials provided by Cisco are studied.

OPEN SOURCE TECHNOLOGIES

Course Code:IFT4413 Credit Units: 03

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc...

Course Contents:

Module I: Introduction to PHP programming
Introduction to PHP, installation and configuration, Variables, String functions, Numeric functions

Module II: Operator, Loops and Array
Operators, Conditions, Loops, Array, Multidimensional Array, Associative array

Module III: Classes and Functions
Classes, Regular Expr, Working with Datetime, code re-use, require (), include (), and the include-path; filesystem functions, and file input and output; file uploads; error handling and logging; sending mail,

Module IV: Working with database
MYSQL, Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications,

Module V: Working with Frameworks
Working with Wordpress, Mambo, Joomla, OS Commerce, Zend Framework, Drupal

Examination Scheme:

Components	CT1	PR	Attd	EE
Weightage (%)	10	15	5	70

Text & References:

Text:
- Beginning PHP, Apache, MySQL Web Development
- Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner

References:
- PHP Manual.

FUNDAMENTALS OF E-COMMERCE AND ERP

Course Code: IFT4414Credit Units: 03

Course Objective:
This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:

Module I: Introduction and Concepts
Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions.
Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.

Module II: Introduction ERP
An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module III: ERP Implementation
To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.

Module IV: The Business Modules
Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

Module V: The ERP Market
ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA) **ERP-Present and Future**
Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"

Module VI: Benefits of ERP
Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:
- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.

PARALLEL PROCESSING

Course Code:IFT4406Credit Units: 04

Course Objective:
This is an introductory course in parallel computing. We will examine parallel architectures, parallel programming, and parallel algorithms and distributed programming. The course is software oriented with applications in high performance computing and scientific computing.

Course Contents:

Module I: Basic Concepts
Introduction to parallel processing, parallel processing terminology, decomposition, complexity, throughout, speedup, measures, data dependence, resource dependence, Bernstein's conditions levels of parallelism in programs. Program flow-control flow, data flow, Distributed systems – Introduction, advantages, tightly-coupled loosely-coupled systems. Hardware and software requirements, design issues.

Module II: Parallel Processing – Structure & Organization
Taxonomy of parallel processes: granularity, basic architectures, multiprocessors, vector processors, pipeline, array, systolic, wave front array, cube architecture, hypercube, CCC, pyramid, prism, network architecture – binary tree, hypertree butterfly, shuffle exchange, dataflow architecture, connection machine.
Distributed Systems: Review of networks, layered protocols – Physical, data link network, transport, application, Network operating system, Distributed Operating System, Resource sharing, Message passing, example system, Synchronization aspects, clocks, algorithms, Mutual exclusion, coroutines, CSP, DP, Deadlocks, Distributed deadlock detection, Modelling – Petri Nets.

Module III: Parallel Algorithms
PRAM model of computation, Elementary parallel algorithms – Broadcast, prefix sums, permutation, parallel selection, merging, sorting, Odd-even, bitonic merge, dictionary operations, elliss, Algorithm Graph Algorithms, Matrix-transportation, multiplication, solving linear systems.

Module IV: Parallel & Distributed Programming
Parallel Programming environments, models, synchronous asynchronous programming, modulla-2, occamm, FORTRAN, DAP FORTRAN, Actus, data flow programming, VAL.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	10	15	5	70

Text & References:

Text:
- Michael J. Quinn, "Parallel Computing – Theory and Practice, 2nd Edition, McGraw Hill,1994
- Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", McGraw Hill Inc, 1993
- S. G. Akl, "The Design and Analysis of parallel algorithms", Englewood Cliffs, NJ, 1989

References:
- A. S. Tanenbaum, "Modern Operating System", PHI, 1996.
- R. H. Perrott, "Parallel Programming", Addison Wesley, 1987.
- T. G. Lewie and H. Ele-Revini, "Introduction to Parallel computing", PHI, NJ, 1992.

MOBILE COMPUTING

Course Code: IFT4415Credit Units: 04

Course Objective:
The objective of the course is to introduce the students with the various upcoming technologies in the area of mobile computing including GSM, GPRS and WAP etc.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.

Module II: Global System for Mobile Communication (GSM) system overview
GSM Architecture, Mobility management, Network signaling.

Module III: General Packet Radio Services (GPRS)
GPRS Architecture, GPRS Network Nodes.

Module IV: Mobile Data Communication
WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Module V: Wireless Application Protocol (WAP)
The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module VI: Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Module VII: Wireless Local Loop (WLL)
Introduction to WLL Architecture, wireless Local Loop Technologies.

Module VIII: Global Mobile Satellite Systems
Case studies of the IRIDIUM and GLOBALSTAR systems.

Module IX: Wireless Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue-tooth Protocols.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	10	15	5	70

Text & References:
Text:
- Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- Mobile and Personal Communication systems and services, by Raj Pandya, Prentice Hall of India, 2001.

References:
- Guide to Designing and Implementing wireless LANs, by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- Wireless Web Development, Ray Rischpater, Springer Publishing, 2000.
- The Wireless Application Protocol, by Sandeep Singhal, Pearson Education Asia, 2000.
- Third Generation Mobile Telecommunication systems, by P. Stavronlakis, Springer Publishers, 2001.

ADVANCED COMPUTER ARCHITECTURE

Course Code: IFT4408   **Credit Units: 04**

Course Objective:
The course focuses on processor design, pipelining, superscalar, out-of-order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques. Advanced topics include a survey of parallel architectures and future directions in computer architecture.

Course Contents:

Module I: Introduction to Computer Models/Architectures
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks

Module II: Program and network properties
Conditions of parallelism, Data and resource dependencies, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module III: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module IV: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Module V: Memory Technology
Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module VI: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, direct mapping and associative caches.

Module VII: Pipelining
Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines

Module VIII: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.

Module IX: Synchronous Parallel Processing
SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement

Module X:
Embedded system, Any case study.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	10	15	5	70

Text & References:

Text:
- Advanced computer architecture, Kai Hwang, TMH.
- Computer Architecture and organization, J.P. Hayes, MGH.
- Memory System and Pipelined processors, Harvey G. Cragon, Narosa Publication.

References:
- Parallel Computing Architecture: A h/w and s/w approach, David E. Culler, Jaswinder pal Singh, Morgan Kaufmann/Elsevier Publishers.
- Parallel computer, V. Rajaranam & C. S. R. Murthy, PHI.
- Foundation of Parallel Processing, R.K. Ghose, Rajan Moona & Phalguni Gupta, Narosa
- Kai Hwang and Zu, "Scalable Parallel Computers Architecture"; MGH.

OPEN SOURCE TECHNOLOGIES LAB

Course Code: IFT4416   Credit Units: 01

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php sever. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program sort ten number by using array.
5. Create a database in MySql and connect that database from PHP.
6. Write a program to Update, insert and delete the values of table in Question No – 9 database.

Examination Scheme:

Components	CT1 (Lab)	A/P/C	Attd	EE(PR)
Weightage (%)	10	15	5	70

INTERNET AND JAVA PROGRAMMING LAB

Course Code: IFT4411Credit Units: 02

List of JAVA Programmes

1. Write a Java Program to compute & print factorial of any given number.
2. Write a Java Program to compute the sum of digits of a given integer.
3. Write a Java Program to calculate & print first n Fibonacci numbers.
4. Write a Java Program to reverse the digits of a numbers.
5. Assume that a bank maintains two kinds of account for its customers, one called saving and other current. The saving account provides compound interest and withdrawal facilities but not cheque book. The current account provides cheque book but no interest. Current account holders should also maintain a min balance & if the balance falls below, a service charge is imposed. Create a class Account that stores customer name, account number & type of account. From this derive the classes Curr-acc & Sav-acc to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:
   a) Accept deposit from a customer and update the balance
   b) Display the balance.
   c) Compute and deposit interest
   d) Permit withdrawal and update the balance.
   e) Check for the minimum balance, impose penalty. If necessary, and update the balance
6. Write a Java Program to sort element of the array.
7. Write a Java Program to read marks out of 100 declare result as follows:
   a. 60 or more   1st class
   b. 50-59   2nd class
   c. 40-49   pass
   d. Less than 40   fail
8. Write a java program to check whether a year is a leap year or not.
9. Write a Java Program to read string from console and display the number of occurrence of each word
10. Write a Java Program to demonstrate use of Inheritance through vehicle, two wheeler, four wheeler and three-wheeler class.
11. Write a Java Program to demonstrate runtime polymorphism with the help of abstract classes.
12. Write a Java Program to demonstrate runtime polymorphism with the help of interfaces.
13. Write a java program to display the use of all access modifiers with the help of two packages
14. Write a Java Program to take a filename as command line argument and display its contents.
15. Write a Java Program that reads a file and then displays it, with a line number before each line.
16. Write a Java Program that displays number of characters, lines and words in a text file.
17. Write a Java Program that appends the contents of one file to another.
18. Write a Java Program to demonstrate how we can make sure that the main thread gets executed after the child threads finishes.
19. Write a Java Program to show exception handling. Also demonstrate the use of finally.
20. Write a Java program which takes as input a number and throws a user defined exception when number is greater than 10.
21. Write a Java Program to demonstrate the use of throws. Also show what happens if a parent exception class precedes a child exception class in the throws class.
22. Write a Java Program to demonstrate the Applet Life Cycle.
23. Develop an applet that displays the received integer in one text box and then on pressing the compute button, displays the factorial in another text box.
24. Write a Java Program to demonstrate a working chat applet (Create both server and client).
25. Write a Java Program to roll a given string diagonally in an Applet. Make use of <param> tag for setting the width and height of the applet.
26. Write a Java Program a program to show how interface can be used to support multiple inheritances in java.
27. Create an applet that will have a text area and a Frame. When any mouse event occurs on the frame, make an entry of that event into the text area. For example, add "Mouse Dragged" when the mouse id dragged.
28. Write a Java program to demonstrate the concept of key event handling.
29. Write a Java program to demonstrate the concept of mouse event handling.

30. Create an applet with Border Layout, with a button in each of the border layout component.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ROUTING PROTOCOLS AND CONCEPTS LAB

Course Code: IFT4412Credit Units: 01

Course Contents:

Cabling a Network and Basic Router Configuration
- Cable devices and establish console connections.
- Erase and reload the routers.
- Perform basic IOS command line interface operations.
- Perform basic router configuration.
- Verify and test configurations using show commands, ping and traceroute.
- Create a startup configuration file.
- Reload a startup configuration file.
- Install a terminal emulation program.

Basic Router Configuration
- Cable a network according to the Topology Diagram given by Lab Coordinator
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Ethernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Challenge Router Configuration
- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Serial and Ethernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Basic Static Route Configuration
- Cable a network according to the Topology Diagram given by Lab Coordinator
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Interpret **debug ip routing** output.
- Configure and activate Serial and Ethernet interfaces.
- Test connectivity.
- Gather information to discover causes for lack of connectivity between devices.
- Configure a static route using an intermediate address.
- Configure a static route using an exit interface.
- Compare a static route with intermediate address to a static route with exit interface.
- Configure a default static route.
- Configure a summary static route.
- Document the network implementation.

Challenge Static Route Configuration
- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Serial and Ethernet interfaces.
- Determine appropriate static, summary, and default routes.

- Test and verify configurations.
- Reflect upon and document the network implementation.
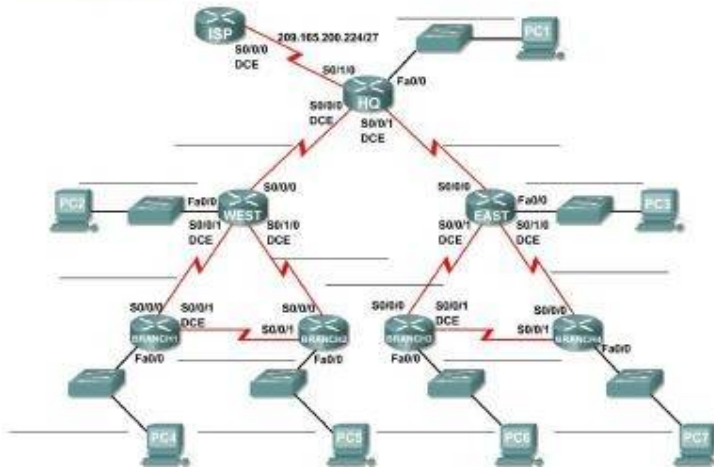
Subnetting Scenario 1

Topology Diagram
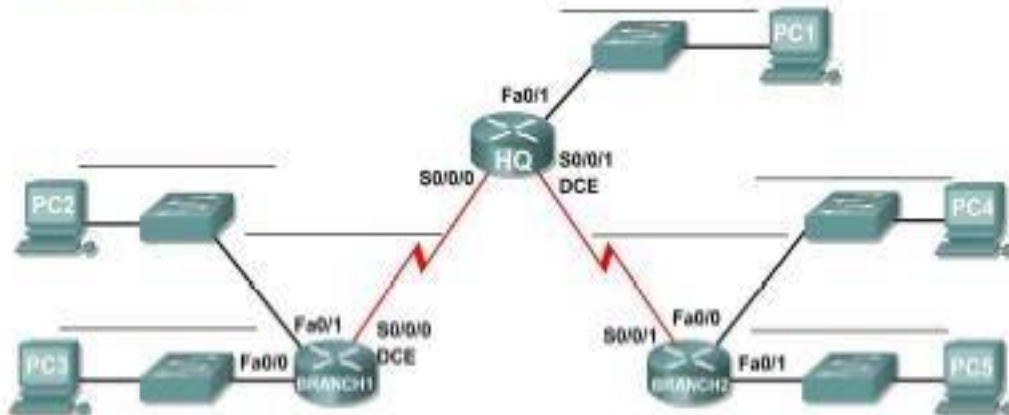
- Determine the number of subnets needed.
- Determine the number of hosts needed.
- Design an appropriate addressing scheme.
- Assign addresses and subnet mask pairs to device interfaces and hosts.
- Examine the use of the available network address space.
- Determine how static routing could be applied to the network.

7.0 Subnetting Scenario 2

Topology Diagram

Determine the number of subnets needed.
Determine the number of hosts needed.
Design an appropriate addressing scheme.
Assign addresses and subnet mask pairs to device interfaces and hosts.
Examine the use of the available network address space.
Determine how static routing could be applied to the network.

8.0 Routing Table Interpretation Lab
Given: The output from the HQ router
HQ#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o – ODR
P - periodic downloaded static route
Gateway of last resort is not set
10.0.0.0/30 is subnetted, 1 subnets
C 10.10.10.252 is directly connected, Serial0/0/0
172.16.0.0/30 is subnetted, 1 subnets
C 172.16.100.0 is directly connected, Serial0/0/1
R 192.168.1.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
R 192.168.2.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
R 192.168.3.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
C 192.168.4.0/24 is directly connected, Loopback0
C 192.168.5.0/24 is directly connected, Loopback1
C 192.168.6.0/24 is directly connected, Loopback2
R 192.168.7.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1
R 192.168.8.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1
R 192.168.9.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1

Given: The output from the BRANCH1 router
BRANCH1#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o – ODR
P - periodic downloaded static route
Gateway of last resort is not set
10.0.0.0/30 is subnetted, 1 subnets
C 10.10.10.252 is directly connected, Serial0/0/0
R 172.16.0.0/16 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0
C 192.168.1.0/24 is directly connected, Loopback0
C 192.168.2.0/24 is directly connected, Loopback1
C 192.168.3.0/24 is directly connected, Loopback2
R 192.168.4.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0
R 192.168.5.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0
R 192.168.6.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0
R 192.168.7.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0
R 192.168.8.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0
R 192.168.9.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0

Given the output from the BRANCH2 router
BRANCH2#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o – ODR
P - periodic downloaded static route
Gateway of last resort is not set
R 10.0.0.0/8 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
/30 is subnetted, 1 subnets
C 172.16.100.0 is directly connected, Serial0/0/1
R 192.168.1.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.2.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.3.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.4.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1

R 192.168.5.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.6.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
C 192.168.7.0/24 is directly connected, Loopback0
C 192.168.8.0/24 is directly connected, Loopback1
C 192.168.9.0/24 is directly connected, Loopback2

Draw a diagram of the network based on your interpretation of the router outputs and do the following:
- Interpret router outputs.
- Identify the IP addresses for each router.
- Draw a diagram of the network topology.
- Cable and configure a network based on the topology diagram.
- Test and verify full connectivity.
- Reflect upon and document the network implementation.

Basic RIP Configuration
- Cable a network according to the Topology Diagram given below
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure RIP routing on all routers.
- Verify RIP routing using **show** and **debug** commands.
- Reconfigure the network to make it contiguous.
- Observe automatic summarization at boundary router.
- Gather information about RIP processing using the **debug ip rip** command.
- Configure a static default route.
- Propagate default routes to RIP neighbors.
- Document the RIP configuration.

Scenarios
• Scenario A: Running RIPv1 on Classful Networks

Scenario A: Running RIPv1 on Classful Networks
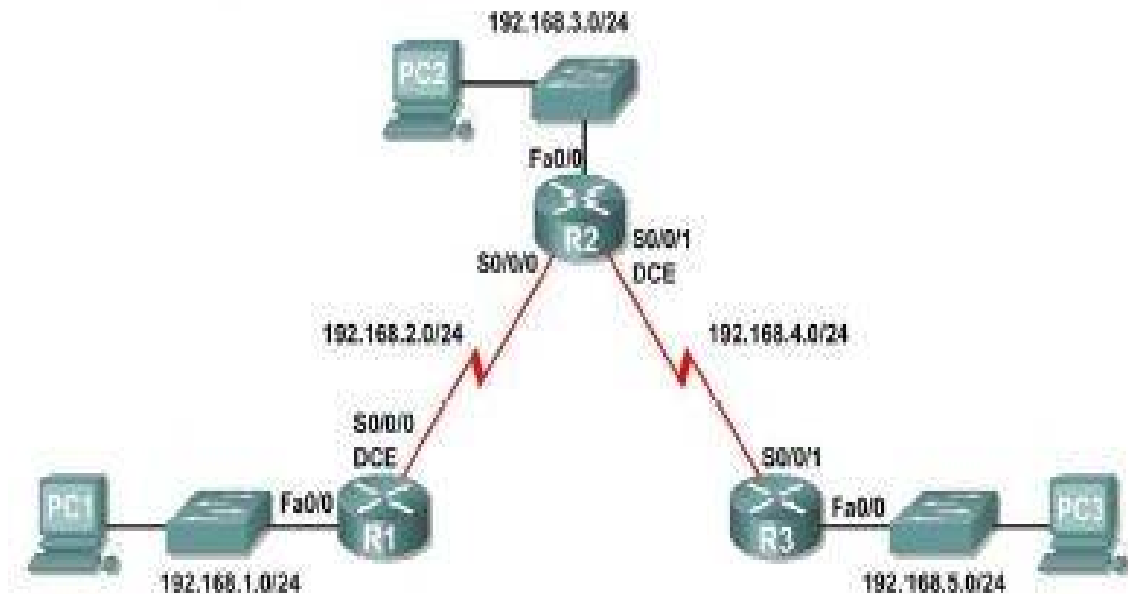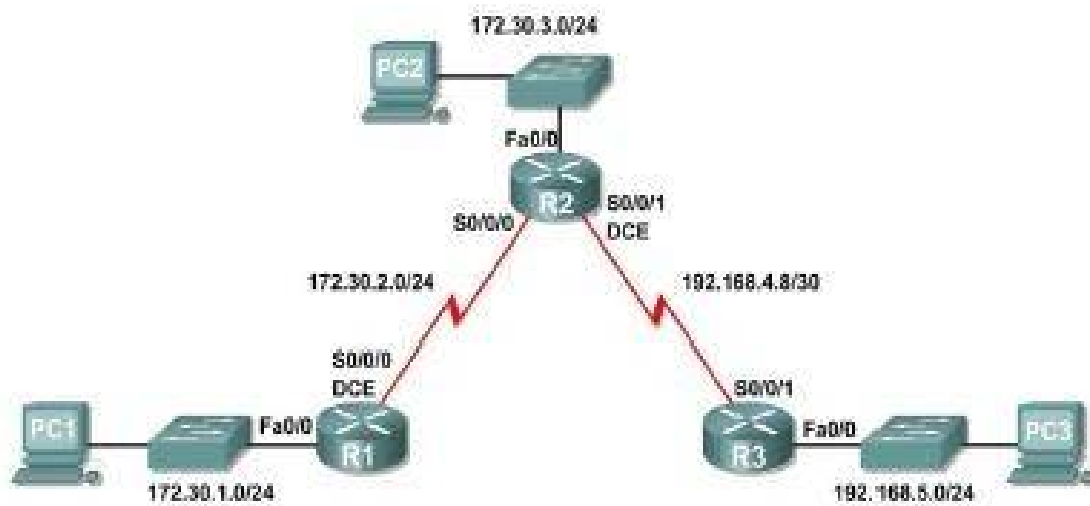
Topology Diagram

• Scenario B: Running RIPv1 with Subnets and Between Classful Networks
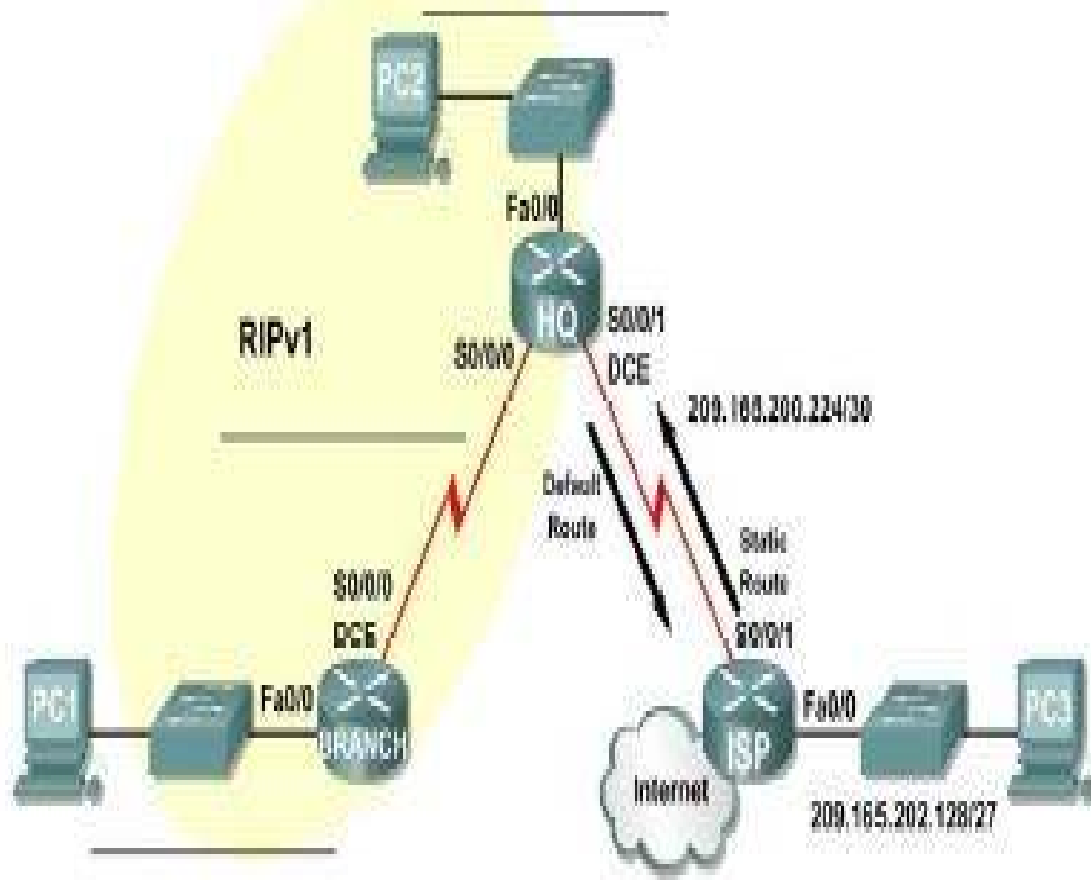
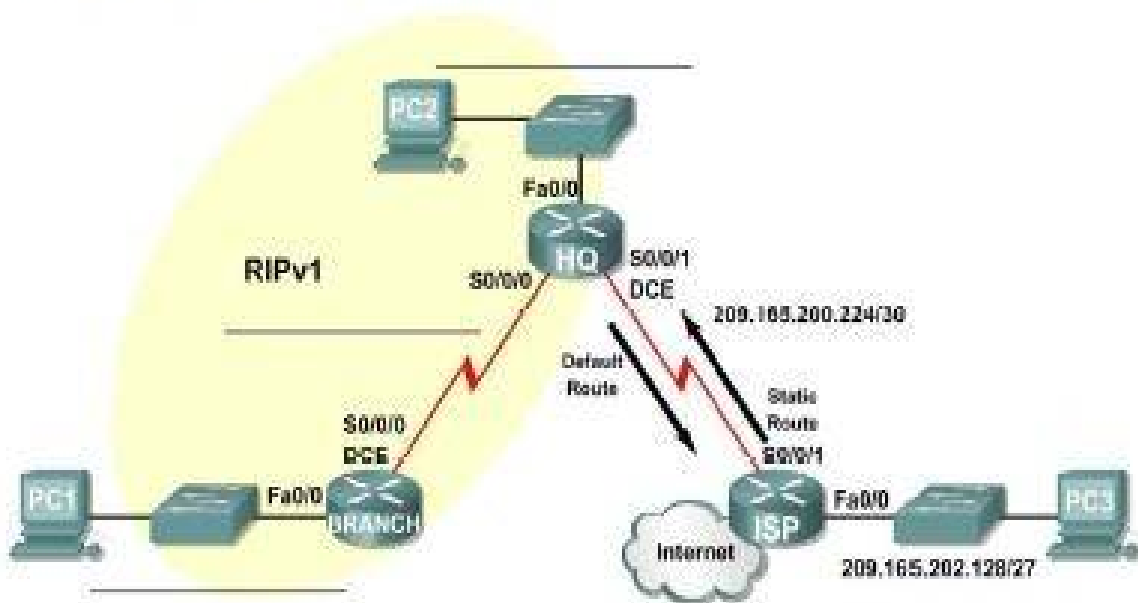## Scenario B: Running RIPv1 with Subnets and Between Classful Networks

Topology Diagram

Scenario C: Running RIPv1 on a Stub Network

Topology Diagram

**10.0 Challenge RIP Configuration**

Topology Diagram

Subnet an address space given requirements.

• Assign appropriate addresses to interfaces and document them in the Addressing Table.

• Cable a network according to the Topology Diagram.
• Erase the startup configuration and reload a router to the default state.
• Configure RIPv1 routing on all routers.
• Configure and propagate a static default route.
• Verify RIPv1 operation.
• Test and verify full connectivity.
• Reflect upon and document the network implementation.

Basic VLSM Calculation and Addressing Design

Topology Diagram
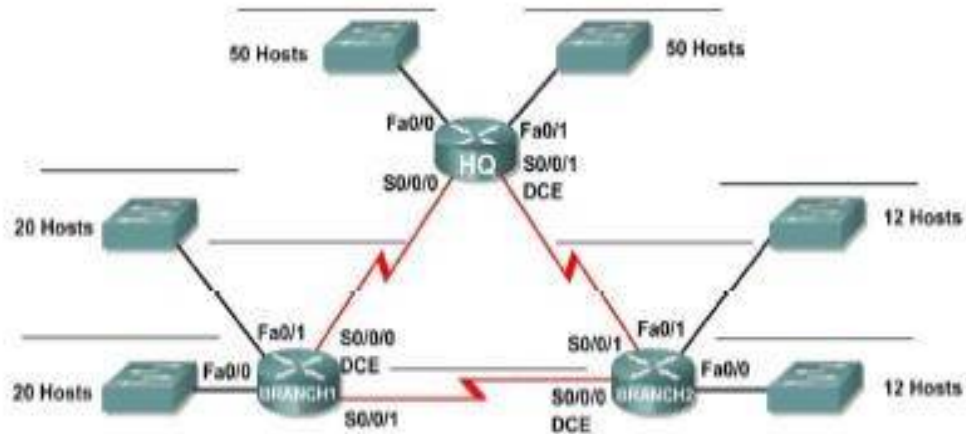
- Determine the number of subnets needed.
- Determine the number of hosts needed for each subnet
- Design an appropriate addressing scheme using VLSM.
- Assign addresses and subnet mask pairs to device interfaces.
- Examine the use of the available network address space.
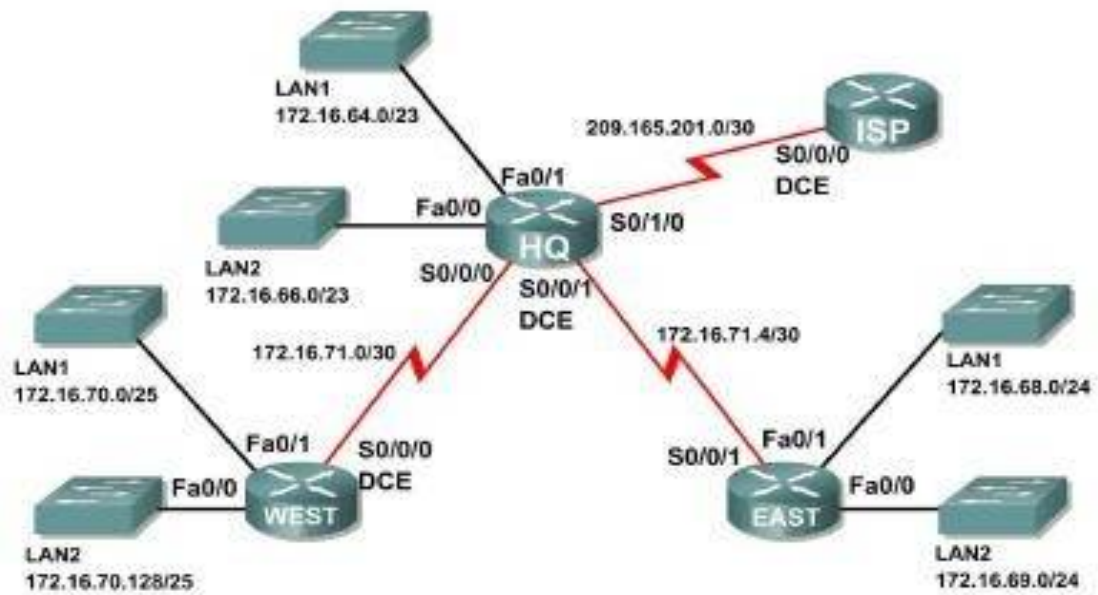
Troubleshooting a VLSM Addressing Design
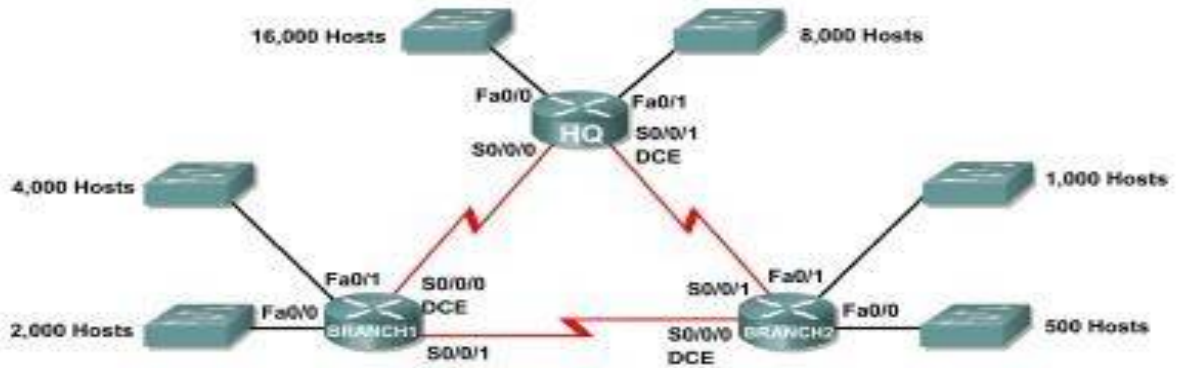
Topology Diagram

- Discover errors in a VLSM design.
- Propose solutions for VLSM design errors.
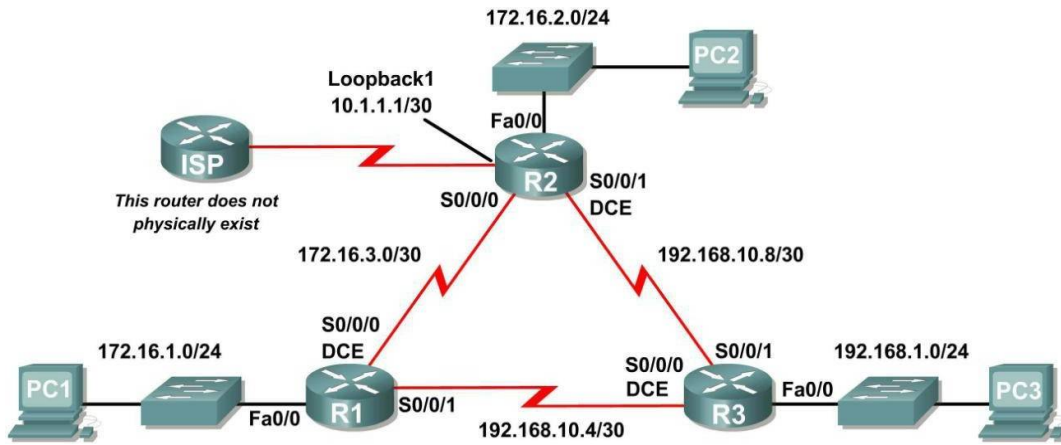- Document the corrected VLSM assignments.

13.0 Basic Route Summarization

Topology Diagram

Determine summarized routes that can be used to reduce the size of routing tables
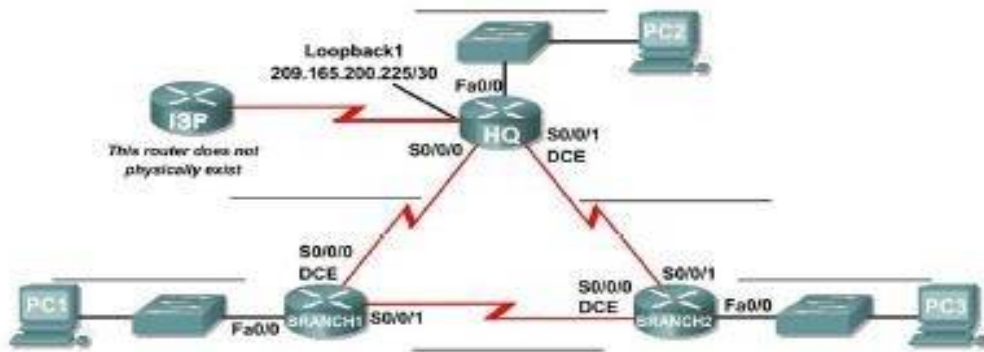
15.0 Basic EIGRP Configuration Lab

- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure EIGRP routing on all routers.
- Verify EIGRP routing using **show** commands.
- Disable automatic summarization.
- Configure manual summarization.
- Configure a static default route.
- Propagate default route to EIGRP neighbors.
- Document the EIGRP configuration.

## 16.0 Challenge EIGRP Configuration Lab

Topology Diagram

- Create an efficient VLSM design given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Configure routers including EIGRP.
- Configure and propagate a static default route.
- Verify EIGRP operation.
- Test and verify full connectivity.
- Reflect upon and document the network implementation.

17.0 Basic OSPF Configuration Lab

- Cable a network according to the Topology Diagram

Topology Diagram
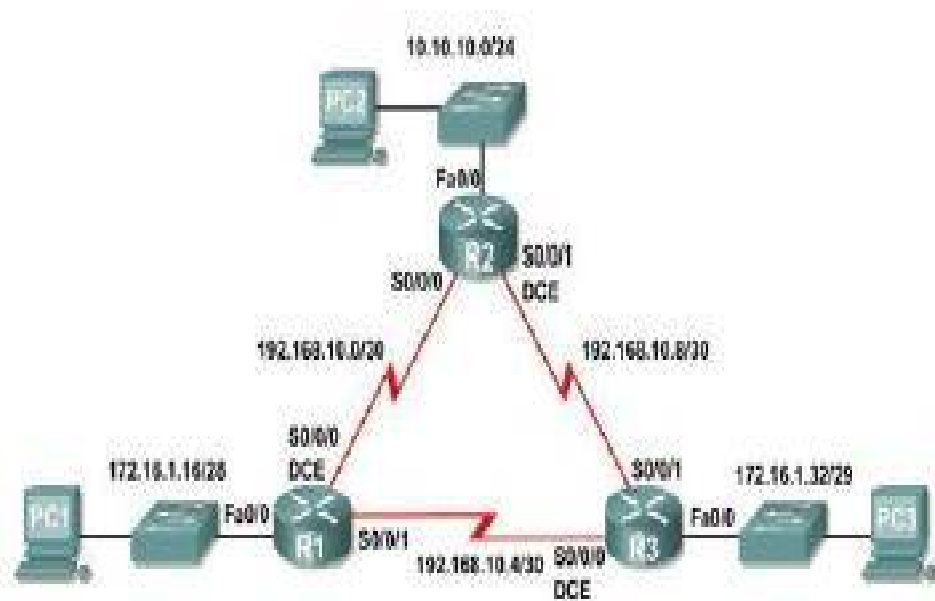
-
- Erase the startup configuration and reload a router to the default state
- Perform basic configuration tasks on a router
- Configure and activate interfaces
- Configure OSPF routing on all routers
- Configure OSPF router IDs
- Verify OSPF routing using show commands
- Configure a static default route
- Propagate default route to OSPF neighbors
- Configure OSPF Hello and Dead Timers
- Configure OSPF on a multi-access network, priority and election process

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

S/w Required: Packet Tracer