BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

COMPUTER TECHNOLOGY

TECHNOLOGY CODE: **666**

7th SEMESTER

COMPUTER TECHNOLOGY (666)

7th Semester

Sl. No.	Subject Code	Name of the Subject	T	P	C	Theory Cont. Assess	Theory Final Exam	Practical Cont. Assess	Practical Final Exam	Total
1	66671	System Analysis & Design	2	3	3	40	60	25	25	150
2	66672	Network Administration & Services	2	6	4	40	60	50	50	200
3	66673	Apps Development Project	0	6	2	-	-	50	50	100
4	66674	E-Commerce & CMS	2	6	4	40	60	50	50	200
5	66675	Cyber Security & Ethics	1	3	2	20	30	25	25	100
6	6667X	Optional Subject-II	2	3	3	40	60	25	25	150
7	65853	Innovation & Entrepreneurship	2	0	2	40	60	-	-	100
Total			**11**	**27**	**20**	**220**	**330**	**225**	**225**	**1000**

Optional Subject-II (6667x)

1.	**Network Maintenance Group**	Option-II	66676	Network Security System
2.	**Automation System Group**	Option-II	66677	Embedded System Design
3.	**Software Developer Group**	Option-II	66678	Advanced Database Management System
4.	**Multimedia Developer Group**	Option-II	66679	Game Development

66671   **SYSTEM ANALYSIS & DESIGN**   **T P C**
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AIMS

To provide the students with an opportunity to acquire knowledge, skill and attitude in the fields of system analysis, design and computer based development with special emphasis on system concept, system development life cycle, system analysis, system design & Development, implementation & Information security and object-oriented system design.

SHORT DESCRIPTION

System concept, system development life cycle, system analysis, system design & Development, implementation& Information security and object-oriented system design.

DETAIL DESCRIPTION
Theory:

1. Understand the elements of information systems and management.
1.1   Define system and information systems.
1.2   Mention the characteristics of systems.
1.3   Describe the key elements of a system.
1.4   Define open and closed system.
1.5   Describe the characteristics of open system.
1.6   Describe the categories of information.
1.7   State the qualities of information.
1.8   State the need of computer based information system.

2. Understand the Organizational functions and system development life cycle.
2.1   State the common functions of an organization.
2.2   State the various functions an educational institution.
2.3   State the functions of various departments of a manufacturing organization.
2.4 Describe the Management and Information System levels in an organization.
2.5 State the meaning of system development life cycle.
2.6 Describe the function of each stages of system development life cycle (SDLC).

3. Understand the roles of system analyst and functions of MIS facility center.
3.1   State the meaning of systems Analyst and system analysis
3.2   Describe the skills required for a system analyst.
3.3   Describe the relationship between interpersonal and technical skills required in different stages of system development.
3.4 Mention the primary functions of an MIS facility center.
3.5 State the activities of administrator in an MIS facility center.
3.6 Describe different structures of systems analysis.
3.7 Describe different functions, responsibilities and duties of system analyst, programmers and operators.

4. Understand the process of initial investigation and information gathering.
4.1   Mention the steps of systems analysis.
4.2   State the meaning of system planning.
4.3   List the probable fields of a user request form.
4.4   Describe the steps of initial investigation process.
4.5   Mention the sources and categories of information.
4.6 List the information gathering tools.

4.7 Mention the phases of information gathering.

4.8 Describe the information gathering methods.

4.9 State the guideline of a successful interview.

4.10 State the types of questionnaires.

5. Understand the tools of structured analysis.

5.1 State the meaning of structured analysis.

5.2 List the name of tools of structured analysis.

5.3 Define physical document flow diagram and logical data flow diagram (DFD).

5.4 State the meaning and functions of DFD symbols.

5.5 Mention the thumb rules of drawing DFDs.

5.6 Draw sample document flow diagram and data flow diagram (DFD).

5.7 State the meaning of decision trees, decision table, structured English and data dictionary.

5.8 Prepare DFD, decision trees, decision table, structured English and data dictionary for sample small process like store/purchase/accounts /order/receive etc.

6. Understand the feasibility analysis.

6.1 Mention the meaning of feasibility study.

6.2 Describe the economic, technical and behavioral feasibility.

6.3 Describe the steps in feasibility analysis.

6.4 State the categories of cost and benefit.

6.5 State the procedure for cost/benefit determination.

6.6 State the alternating solutions to be examined during feasibility analysis.

6.7 State the content of feasibility report.

7. Understand the system design and development.

7.1 Mention the meaning of systems design and development.

7.2 Distinguish between logical design and physical design.

7.3 Mention activities covered in systems design and development.

7.4 Mention the steps in physical systems design and design methodologies.

7.5 Mention the meaning of input/output design.

7.6 Mention the characteristics of different forms.

7.7 Describe the factors to be considered to design a form.

7.8 Describe the objectives of database and steps of database design.

7.9 State the structure and general principles to be used in designing output reports.

8. Understand the process of systems testing and security.

8.1 Describe the objectives of control and testing the information systems.

8.2 Describe different types of systems test.

8.3 Describe the quality factor specification.

8.4 State the term Information Security Management System (ISMS)

8.5 Explain the information security risk management process.

8.6 State the requirements to be met to ensure security of information systems.

9. Understand the implementation and software maintenance activities.

9.1 Mention the activities considered in systems conversion.

9.2 Describe the need of user training.

9.3 Describe the post implementation activities.

9.4 State the points to be mentioned for requesting proposal from vendors.

9.5 Prepare a feature form to make a comparative evaluation of vendors' proposal for computer system.

10. Understand the concept of object-oriented approach.
   10.1 Define object oriented analysis and design.
   10.2 State the elements of Object-Oriented system.
   10.3 Distinguish between structured approach and object-oriented approach.
   10.4 Define Unified Modeling Language (UML).
   10.5 State the ways to apply UML.
   10.6 Describe the perspectives to apply UML.
   10.7 Describe the object-oriented system development life cycle.

   PRACTICAL:

Perform the tasks to develop any one of the following software using standard programming language and necessary tools (using Python/ Java/ C/C++ /C#/Visual programming/ MySQL/ PostgreSQL /Oracle/ HTML/XML/JS/CSS or any other necessary software).

- Polytechnic institute management system
- School management system
- Hotel management system
- Accounting software
- Transport ticketing management system
- Departmental store management system
- Admission management system
- Billing management system.
- Library management system
- Online voting system
- Student attendance system
- Any other computerized system/control system/operating system/ network system/ packages/ educational/ entertainment software.

   STEPS:
Step-1: Perform the collection of documents to recognize the need of a new computerized system.
Step-2: Perform the collection of information of the personnel currently solving the problem into the manual system.
Step-3: Perform the observation of existing system process & gather information by interview and questionnaires.
Step-4: Perform the preparation of end-user's requirements & select the feasible solution for the alternative candidate systems.
Step-5: Perform the design of external forms, input & dialogue screens.
Step-6: Perform the design of reports, display screens & databases.
Step-7: Perform the design of test plan & procedure.
Step-8: Perform the selection of tools, databases and development of menus.
Step-9: Perform the development of input screens and dialogues.
Step-10: Perform the development of modules for data entry & processing.
Step-11: Perform the development of modules for output display and printing.
Step-12: Perform the integration & testing of the developed systems.
Step-13: Perform the preparation of manuals & documentations.

   REFERENCE BOOKS
1. System Analysis and Design - Elias M. Awad
2. Analysis and Design of Information Systems - V. Rajaraman
3. System Analysis and Design Methods - Whitten, Bently, Barlow

66672	Network Administration & Services	T P C
		2 6 4

AIMS

- To be able to design computer network system
- To be able to acquire the knowledge on Network Administration.
- To be able to provide the knowledge and to develop skill on Different routing protocol.
- To be able to acquire the knowledge on learning, forwarding and filtering decision.
- To be able to provide the knowledge and to develop skill on network Security.
- To be able to provide the knowledge and to develop skill on Router, Switch, NIC and Cabling.
- To be able to establish and implement Link Redundancy.

SHORT DESCRIPTION

Network Basics; Sub-netting, VLSM, Summarization; Internet Routing Protocol, Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), Spanning Tree Protocol (STP), VLANs and Inter-VLAN routing, network address translator (NAT), network security, Internet Protocol Version 6 (IPv6), Link and Gateway Redundancy.

DETAILS DESCRIPTION
Theory:

1. Review the network theories.
   1.1. Describe OSI, TCP/IP model
   1.2. Identify collision and broadcast domain.
   1.3. Describe Ethernet cabling straight-through, crossover, and console.
   1.4. Data encapsulation of TCP/IP layer
   1.5. Understand three layer's Hierarchical model.

2. Understand Sub-netting, VLSMs, and Summarization.
   2.1. Define Sub-netting Basics.
   2.2. Define Classless inter domain routing (CIDR), including class A, class B, class C.
   2.3. Define Variable length subnet mask (VLSMs)
   2.4. Describe VLSM design and implementing VLSM Network
   2.5. Define Summarization

3. Understand Internet Protocol Routing.
   3.1. Define Routing basics
   3.2. Configure IP Routing in network.
   3.3. Define Static routing
   3.4. Define default routing.
   3.5. Define dynamic routing
   3.6. Describe Routing information protocol.

4. Open Shortest Path First (OSPF).
4.1. Define OSPF basics.
4.2. Describe OSPF terminology.
4.3. Define OSPF operation
4.4. Describe Loopback interface
4.5. Describe OSPF areas
4.6. Describe virtual link

5. Enhanced Interior Gateway Routing Protocol (EIGRP)
5.1. Define Introduction to EIGRP
5.2. State the configuration of EIGRP
5.3. State EIGRP Neighbor Adjacency
5.4. Describe EIGRP Neighbor and topology table
5.5. Describe EIGRP Unequal Cost Load Balancing
5.6. State EIGRP K values.

6. Understand Spanning Tree Protocol (STP).
6.1. Define Spanning Tree.
6.2. Describe Spanning Tree cost calculation.
6.3. Define Spanning Tree port states.
6.4. Define Spanning Tree portfast.
6.5. Define Rapid Spanning Tree.
6.6. Define Spanning Tree BPDU Guard.
6.7. Define Spanning Tree BPDU Filter.
6.8. Define Spanning Tree Root guard.
6.9. Define Ether-channel.

7. Understand VLANs and Inter-VLAN routing.
7.1. Define VLANs
7.2. State 802.1Q and ISL Encapsulation.
7.3. Define Trunk link
7.4. Describe Router on a Stick.
7.5. Describe Inter-VLAN routing by multilayer switch
7.6. State the configuration of VLAN Trunking protocol (VTP)

8. Understand the network address translator (NAT).
8.1. State Network Address Translator (NAT).
8.2. Distinguish static and Dynamic NAT.
8.3. Demonstrate PAT (overloading).

9. Understand the network security
9.1. Define User security level, login security (SSH, Telnet).
9.2. Demonstrate standard Access list.
9.3. Define Extended Access list.
9.4. State Port Security.
9.5. State Protected port.
9.6. Demonstrate DHCP Snooping.
9.7. State Cyber Security.

10. Understand Internet Protocol Version 6 (IPv6).
10.1 Describe the benefits and uses of IPv6
10.2 Define IPv6 addressing and expression
10.3 State how IPv6 works in an Inter-network.
10.4 Define IPv6 Routing protocol (RIP, EIGRP,OSPF).

11. **Understand Link and Gateway Redundancy**
   11.1. Define Redundancy
   11.2. State Static Routing Redundancy
   11.3. Define Hot Standby Router Protocol (HSRP)
   11.4. Define Virtual Router Redundancy Protocol (VRRP)
   11.5. Demonstrate Gateway Load Balancing Protocol (GLBP).

12. **Understand Fourth Industrial Revolution (IR 4.0)**
   12.1 State Internet of Things (IoT).
   12.2 Explain Big Data.
   12.3 State Cloud Computing.
   12.4 Explain System Integration.
   12.5 State Autonomous Vehicles System & Autonomous Robots
   12.6 Explain augmented reality.
   12.7 Explain 3D Printing
   12.8 Explain Additive Manufacturing.

Practical:

1. **Perform the Design, Develop and Simulation of Enhanced Interior Gateway Routing Protocol (EIGRP)**
   1.1 Design network diagram using packet tracer
   1.2 Design proper IP address with network devices.
   1.3 Configure EIGRP as per requirement.
   1.4 Ensure reachability

2. **Perform the Design, Develop and Simulation of Open Shortest Path Routing Protocol (OSPF)**
   2.1   Design network diagram using packet tracer
   2.2   Design proper IP address with network devices.
   2.3   Configure OSPF as per Instruction.
   2.4   Ensure reachability

3. **Perform the Design, Develop and Simulation of Virtual Link.**
   3.1.   Design network diagram using packet tracer
   3.2.   Design proper IP address with network devices.
   3.3.   Configure Virtual Link as per Instruction.
   3.4.   Ensure reachability

4. **Perform the Design, Develop and Simulation of Routing Information Protocol (RIP)**
   4.1.   Design network diagram using packet tracer
   4.2.   Design proper IP address with network devices.
   4.3.   Configure RIP as per requirement.
   4.4.   Ensure reachability

5. **Perform the Design, Develop and Simulation of Static Routing**
   5.1.   Design network diagram using packet tracer
   5.2.   Design proper IP address with network devices.
   5.3.   Configure Static Routing as per requirement.
   5.4.   Ensure reachability

6. **Perform the Design, Develop and Simulation of Default Routing**
    6.1. Design network diagram using packet tracer
    6.2. Design proper IP address with network devices.
    6.3. Configure Default Routing as per requirement.
    6.4. Ensure reachability

7. **Perform the Design, Develop and Simulation of Hot Standard Router Protocol (HSRP)**
    7.1 Design network diagram using packet tracer
    7.2 Design proper IP address with network devices.
    7.3 Configure HSRP as per requirement.
    7.4 Ensure reachability

8. **Perform the Design, Develop and Simulation of Virtual Router Redundancy Protocol (VRRP)**
    8.1 Design network diagram using packet tracer
    8.2 Design proper IP address with network devices.
    8.3 Configure VRRP as per requirement.
    8.4 Ensure reachability

9. **Perform the Design, Develop and Simulation of Network Address Translator (NAT)**
    9.1 Design network diagram using packet tracer
    9.2 Design proper IP address with network devices.
    9.3 Configure NAT as per requirement.
    9.4 Ensure reachability

10. **Perform the Design, Develop and Simulation of Standard Access List (ACL)**
    10.1 Design network diagram using packet tracer
    10.2 Design proper IP address with network devices.
    10.3 Configure ACL as per requirement.
    10.4 Ensure reachability

11. **Perform the Design, Develop and Simulation of Extended Access List (ACL)**
    11.1 Design network diagram using packet tracer
    11.2 Design proper IP address with network devices.
    11.3 Configure ACL as per requirement.
    11.4 Ensure reachability

12. **Perform the Design, Develop and Simulation of Login using Telnet**
    12.1 Design network diagram using packet tracer
    12.2 Design proper IP address with network devices.
    12.3 Configure Telnet as per requirement.
    12.4 Ensure Login operation by username and password.

13. **Perform the Design, Develop and Simulation of Ether-channel**
    13.1 Design network diagram using packet tracer
    13.2 Design proper IP address with network devices.
    13.3 Configure Ether-channel as per requirement.
    13.4 Ensure reachability by single link and group link

14. **Perform the Design, Develop and Simulation of Portfast properties of Spanning Tree**
    14.1 Design network diagram using packet tracer
    14.2 Design proper IP address with network devices.
    14.3 Configure Portfast as per requirement.
    14.4 Ensure reachability

15. **Perform the Design, Develop and Simulation of Port Security properties of Spanning Tree**
    15.1 Design network diagram using packet tracer
    15.2 Design proper IP address with network devices.
    15.3 Configure Port Security as per requirement.
    15.4 Ensure reachability

16. **Perform the Design, Develop and Simulation of Router on a Stick of Inter- VLAN Routing**
    16.1 Design network diagram using packet tracer
    16.2 Design proper IP address with network devices.
    16.3 Configure Router on a Stick as per requirement.
    16.4 Ensure reachability

17. **Perform the Design, Develop and Simulation of Inter-VLAN Routing using Multilayer Switch**
    17.1 Design network diagram using packet tracer
    17.2 Design proper IP address with network devices.
    17.3 Configure Inter- **VLAN** routing as per requirement.
    17.4 Ensure reachability

18. **Perform EIGRP Load Balancing**
    18.1 Design network diagram using packet tracer
    18.2 Design proper IP address with network devices.
    18.3 Configure Load Balance as per requirement.
    18.4 Ensure reachability

Project:

19. **Establish a Computer Physical Network and Demonstrate Administrative Operation and Services (EIGRP, OSPF, NAT, Inter- VLAN Routing, Portfast).**

REFERENCE BOOKS

1. Data communications and Networking – Behrouz A. Forouzan.
2. Fundamentals of Communication-M. Shamim Kaiser and associates
3. Data and Computer Communications-William Stallings
4. Local Area Networking – S. K Basandra.
5. MCSE Windows & Networking Essential – Joe Casad
6. CCNA Routing and Switching – Todd Lammle.
7. How to Master CCNA- Rene Molenaar
8. Principles of Networkand System Administration - Mark Burgess

66674   **E-COMMERCE & CMS**   **T P C**
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OBJECTIVES
- Understand the E-Commerce and E-Commerce Transition in the World.
- Recognize the benefits and limitations of E-Commerce.
- Analyze different E-Commerce business models
- Analyze different E-commerce Payment System.
- Understand the E-Commerce Security System.
- Understand the concept of CMS.

SHORT DESCRIPTION
UNDERSTAND THE CONCEPT OF E-COMMERCE, E-COMMERCE BUSINESS MODELS, INFRASTRUCTURE, MARKETING CONCEPT, E-COMMERCE ENVIRONMENT, E-COMMERCE ‒ PAYMENT SYSTEMS, SECURITY SYSTEMS, CONCEPT OF CMS WITH WORDPRESS / DRUPAL / JOOMLA.

DETAIL DESCRIPTION
Theory:
1. UNDERSTAND THE CONCEPT OF E-COMMERCE.
1.1 Define E-Commerce.
1.2 State the Features of E-Commerce
1.3 Describe the difference of Traditional Commerce v/s E-Commerce
1.4 State the Advantages of E-Commerce Organizations, E-Commerce Customers and E-Commerce Society.
1.5Mention the Technical and Non-Technical Disadvantages of E-Commerce.
1.6 State Electronic Data Interchange (EDI).
1.6 Describe the scopes of E-Commerce.

2. E-COMMERCE BUSINESSMODELS
2.1 Identify the key components of e-commerce business models.
2.2 Describe B2B and B2C business models.
2.3 Describe the ArchitecturalModelsofB2BandB2Cbusiness models.
2.4 Describe C2C and C2B business models.
2.5 Describe B2G and G2B business models.

3. E-COMMERCE INFRASTRUCTURE
3.1 Describe PRINCIPAL COMPONENTS OF E-COMMERCE INFRASTRUCTURE
    (Internet, TCP/IP, Function of Router, Protocol, IP Addresses, Domain Name Systems (DNS), URL: Uniform Resource Locator, Internet Servers and Clients, Ports and HTTP, E-mail Protocols.)
3.2 State World Wide Web (WWW) and Markup Languages.
3.3 State Intranets and Extranets.
3.4 State VIRTUAL PRIVATE NETWORK (VPN) , STORAGE AREA NETWORKS (SANS)
3.5 State the INTERNET CONNECTIVITY OPTIONS (Dial-up, Integrated Services Digital Network (ISDN), Broadband Connections, Wireless Connections)
3.6 Describe the EVOLUTION OF INTERNET AND WORLD WIDE WEB.
4. E-COMMERCE MARKETING CONCEPT
4.1 Mention the features of Traditional Marketing.
4.2 Define Online/Internet/E- Marketing.
4.3 Describe Basic marketing concepts that needed to understand E-Marketing.
4.4 Define E-advertising and E-branding.
4.5 Describe main technologies that support online marketing.
4.6 Describe E-CRM (Customer Relationship Management).

5. E-COMMERCE ENVIRONMENT
5.1 State the major issues raised by e-commerce,
5.2 State Basic concepts related to privacy.

5.3 State HACKER AND CRACKER
5.4 State Practices of e-commerce companies that threaten privacy.
5.5 Describe the Different methods used to protect online privacy.
5.6 State Major public safety and welfare issues raised by e-commerce.

6. E-COMMERCE PAYMENT SYSTEMS
6.1 Mention the features of traditional payment systems.
6.2 Describe different types of e-commerce payment systems (Credit Card, Debit Card, Smart Card, E-Money, and Electronic Fund Transfer).
6.3 Describe Payment Process of different types of e-commerce payment systems.

7. E-COMMERCE SECURITY SYSTEMS
7.1MentiontheScope of e-commerce crime.
7.2 Describe security threats in the e-commerce environment,
7.3 Mention the measures to ensure e-commerce security.
7.4 Describe the process how technology helps protect the security of messages sent over the Internet.
7.5 Describe Security Protocols in Internet.
7.6 Describe the Tools used to establish secure Internet communications channels, and protect networks, servers, and clients,

8. UNDERSTAND THE CONCEPT OF CMS
8.1 Define Content Management System (CMS)
8.2 List the Features of CMS.
8.3 Mention the Advantages and Disadvantages of CMS.
8.4 State the different between CMS website, a static website, and websites using other server-side technologies.
8.5 Explain the comparison between three popular open source CMS platform (WordPress, Drupal and Joomla).
8.6Understand the benefits of working with a server-side database and the power it brings to creating and managing websites CMS.

PRACTICAL:

- Create and deploy a small E-Commerce websites using CMS, including creating and editing content, adding functionality, and creating custom templates and themes based on Open Cart/WordPress / Drupal / Joomla.

References:
1. E-Commerce 2011, Author: Kenneth Laudon, Carol GuercioTraver.
2. E – Commerce : Strategy Technologies & Applications, Tata McGraw Hill.
3. E-Commerce,M.M. Oka, EPH
4. E-Commerce Concept Model And Strategy, C.S.V. Murthy, Himaliya Publishing
5. E-Commerce, Jibitesh Mishra, Macmillan Publishers India
6. E-COMMERCE: A Managerial Perspective, P.T. Joseph, PHI, fifth printing
7. Global E-Commerce, J. Christopher & T.H.K. Clerk, University Press
8. Beginning E-Commerce, Reynolds, SPD
9. Cyber Warfare: Techniques, Tactics and Tools for Security Practitioners,
            Author: Jason Andress, Steve Winterfeld

66673   **Apps Development Project**   **T P C**
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AIMS

After completion of the course students will be able to acquire knowledge, skill, attitude in the area of Apps Development emphasizes on:

- Skills to design and build an Android application from scratch.
- Thorough understanding of main components of an Android application and its entire life cycle.
- Ability to use tools to debug and maintain your Android applications.
- Using external resources, manifesting adapters and file intents.
- Understand storage tools and techniques: files, preferences, databases, and content providers.
- Using background processing techniques available in Android.

SHORT DESCRIPTION

Introduction to Android Programming, Fundamentals, Classes, Layout, Exception Handling, Android Components, Content providers, Messaging, Connectivity, Location services, Build and App Publish.

DETAIL DESCRITION

1. Create Android Environment for App Development.
    1.1 Install the latest Android Studio.
    1.2 Install Android SDK.
    1.3 Configure the IDE.
    1.4 Find your configuration files.
    1.5 Explore the IDE.
    1.6 Define Android Scope.
    1.7 Features of Android.
    1.8 Understand SDK, AVD and Emulator.

2. Create an Application and understand the Anatomy.
    2.1 Explore Application Framework.
    2.2 Explore Application Component.
    2.3 Create a Hello World Program.
    2.4 Explore Anatomy of Application – Folder, File & Description.
    2.5 Describe Main Activity File, Manifest File, Strings File, Layout File.
    2.6 Debug and Exception handle procedure.

3. Work with Activities.
    3.1 Define Android Activity and Understand Activity life cycle.
    3.2 Handle Activity State Changes.
    3.3 Create an Android application and test your app's activities.
    3.4 Create an activity.
    3.5 Drive the activity to a new state.
    3.6 Recreate the activity.
    3.7 Trigger actions in the activity.

4. Work with Fragment.
    4.1 Explore fragment life cycle, use and types of fragments.
    4.2 Create a Fragment Class.
    4.3 Build a flexible UI.
    4.4 Add a Fragment to an Activity at Runtime.
    4.5 Replace One Fragment with Another.

4.6 Communicate with other fragments.

4.7 Deliver a Message to a Fragment.

5. Work with Android Intents and Filters.

5.1 Understand the intent object and fundamental use cases.

5.2 Explore Intent types.

5.3 Data transfer between activities.

5.4 Register an Activity for the Intent which is triggered when someone wants to open a webpage.

5.5 Build a service in your app to download a file from the web.

6. Create Android User Interface.

6.1 Understand the basic building block for user interface.

6.2 Explore the Frame layout, Linear layout, Table layout, Relative layout, Frame layout, List View, Grid View

6.3 Adapt layout attributes.

6.4 Build Layouts with an Adapter.

6.5 Improve layout performance.

7. Design user Interface with views.

7.1 Add Text, Buttons, checkboxes, radio buttons, toggle buttons, spinners, pickers, tooltips to the layout files.

7.2 Create and manage notifications and channels, modify notification badges.

7.3 Create an activity from a notification.

7.4 Add app bar.

7.5 Dim system bars, Hide status bar and navigation bar.

8. Work with Navigation.

8.1 Design effective navigation.

8.2 Create swipe view with tabs.

8.3 Create a navigation drawer.

8.4 Implement proper Back navigation.

9. Display Pictures and Menus with Views.

9.1 Use Image View, Image Switcher to Display Pictures.

9.2 Use Grid View to Display Pictures.

9.3 Explore Menus with Views.

10. Work with App data & files.

10.1 Save files on device storage - Internal Storage, External Storage (SD Card).

10.2 Save data in a local database.

10.3 Send data to other apps.

10.4 Share files.

10.5 Retrieve file information.

11. Use Content Providers.

11.1 Understand content providers and advantages.

11.2 Accessing and retrieving data from a provider.

11.3 Creating Own Content Providers.

11.4 Create an address book using the Content Provider.

12. Work with Messaging.

12.1 Understand SMS Manager API.

12.2 Analyze Method & Description.

12.3 Send an SMS to the given mobile number.

12.4 Analyze Email Messaging.
12.5 Analyze Extra Data &Description.
12.6 Send an Email to the given recipients.

13. Illustrate Location Based Services.
13.1 Display Maps.
13.2 Get the current location.
13.3 Get the Updated Location.
13.4 Displaying a Location Address.
13.5 Project – Build a Location Tracker.

14. Establish Connectivity.
14.1 Learn how to connect to the network, choose an HTTP client, and perform network operations outside of the UI thread.
14.2 Learn how to check a device's network connection, create a preferences UI for controlling network usage, and respond to connection changes.
14.3 Optimize network data usage.
14.4 Parse XML data.
14.5 Reduce network battery drain.

15. Develop Android Services.
15.1 Creating Own Services - Long Running Task and Services, Repeated Task in a Service, Execute a synchronous Task on separate.
15.2 Establishing Communication Between a Service and Activity.
15.3 Bind activities to services.
15.4 Understand Threading.

16. Configure your build
16.1 The build process.
16.2 Custom build configurations.
16.3 Build configuration files.
16.4 Set the application ID.
16.5 Add build dependencies, Dependency types, configurations.
16.6 Optimize your build speed.
16.7 Configure build variants.

17. Publish your App
17.1 Prepare for release, Gather materials and resources.
17.2 Set application version information.
17.3 Create Certificates and key stores, Manage keys.
17.4 Upload your app bundle.
17.5 Update your App.

18. Create a Contact Book.
18.1 Understand the project scope and requirement analysis.
18.2 Create a Form that will take username, gender, email, phone number.
18.3 Upload user image.
18.4 Store data to database.
18.5 Update and Delete a contact.
18.6 Display user information in List View.
18.7 Test your App with UI-Testing and with testing tools.

19. Create a BMI Tracker.
19.1 Understand the project scope and requirement analysis.
19.2 Create a calculator that will take user height, weight and age.
19.3 Create BMI Standard to compare.

19.4 Show user BMI and give status.
19.5 Store BMI result.
19.6 Display monthly BMI.
19.7 Test your App with UI-Testing and with testing tools.

20. Create a Location based App.
20.1 Understand the project scope and requirement analysis
20.2 Create a form that will take name of type like Hospital, Institute, Fire station.
20.3 Create a form that will take information about Address, contact number, latitude, longitude of the address, basic service related information.
20.4 Create a signup form for user and store.
20.5 Filter nearby locations stored in database.
20.6 Test your App with UI-Testing and with testing tools.

Reference Books

1. Beginning Android programming with Android Studio
   By - J F DIMarjio

2. Hello Android Introducing Google's Mobile Development Platform
By - ED Burnette

Essential Links

1. developer.android.com
2. www.tutorialspoint.com/android

66675   **Cyber Security & Ethics**   **T P C**

                          1 3 2

OBJECTIVES

- To develop knowledge and skill on Cyber Security and Ethics.
- To develop knowledge and skill to create and apply of cyber security.

SHORT DESCRIPTION

Basics of Cyber Security, Implementation of Hardware based and software based security, Data and evidence recovery, Hacking, Cyber crimes, Cyber Ethics, IT Laws;

DETAIL DESCRIPTION

Theory:

1. Understand Cyber Security
 1.1 Define is Cyber Security.
 1.2 Classify Cyber Security.
 1.3 Describe the necessity and role of cyber security.
 1.4 Distinguish between Information security and Cyber security.
 1.5 Describe and explain why information and cyber security are important to business and to society.
 1.6 Explain Security, Identity, Authentication, Confidentiality, Integrity, Availability, Threat, Vulnerability, Risk and hazard;

2. Understand Data and Evidence Recovery
 2.1 Define file recovery. Classify different procedures for file recovery.
 2.2 Define data recovery and Forensic Tool Kit (FTK).
 2.3 Describe various types of computer forensics tools.
 2.4 Discuss various Personal Identifiable Information
 2.5 Discuss various types of E-mail threats.

3. Understand Cyber Crimes
 3.1 Define Cyber Crimes.
 3.2 Discuss various types of Cyber crimes cyber-bullying, cyber extortion, Phishing, Identity Thefts, Scamming, Cyber laundering (Money Laundering 2.0), DDoS Attack etc.
 3.3 Define Malware. Describe various types of Malware.
 3.4 Describes various types of Cyber Crimes such as Hacking, Cracking, Virus Attacks, Pornography, Software piracy.
 3.5 Define Intellectual property.
 3.6 Describe Tracking, IP Tracking, E-mail recovery, Encryption and Decryption methods.
 3.7 Describe password cracking.

4. Understand Hacking
 4.1 Define Hacking with its classification.
 4.2 Describe the reasons and justification of hacking.
 4.3 Describe various Hacking techniques such as Vulnerability scanning, Brute force Attack, Dictionary attack, Password cracking, Packet sniffer, Spoofing attack (Phishing), Programmed threats, Social Engineering etc.

4.4 Define Hacker.

4.5 Describe types of hacker such as script kiddie, white hat (Ethical hacker), black hat (crackers), gray hat, green hat, Red hat, blue hat etc.

5. Understand the basics of security

5.1 Define firewalls and Attack prevention.

5.2 Describe types of firewalls.

5.3 Make a comparison among the types of firewalls.

5.4 Describe basic online security.

5.5 Describe the motives of hackers.

5.6 Describe firewalls as the process of Attack Prevention.

6. Understand Cyber Ethics

6.1 Define Cyber Ethics.

6.2 Define Ethical hacking.

6.3 Describe various aspects of Ethical hacking.

6.4 Describe various laws of Bangladesh about Cyber Security.

6.5 Describe various laws of Bangladesh about Cyber Crimes.

PRACTICAL:

1. Apply password to a computer system and various files such as Microsoft Word, Microsoft Excel etc.

1.1 Start a Computer and enter into BIOS setup.

1.2 Give a password to the BIOS security.

1.3 Open the computer again and give password from Control Panel.

1.4 Create an MS Word file and save it with a password for open and edit.

1.5 Create an MS Excel file and save it with a password for open and edit.

1.6 Create a MS Access file and save it with a password for open and edit.

1.7 Make a report for each of above jobs.

2. Practice to recover an e-mail forgotten password.

2.1 Start a computer and open a browser and go to an e-mail provider such as Gmail, yahoo.

2.2 Try to recover a forgotten password by entering various information

2.3 Login into the e-mail by new password.

2.4 Make a report for the above job.

3. Apply various security steps in e-mail.

3.1 Open an e-mail.

3.2 Go to its **Setting**.

3.3 Apply two-steps verification by entering Mobile number and other e-mail address.

3.4 Try to change e-mail password by applying those security steps.

3.5 Make a report for the above job.

4. Apply various security steps in social media such as Facebook login.

4.1 Open your Facebook account.

4.2 Go to its **Setting**.

4.3 Apply various security steps such as Mobile number and e-mail address

4.4 Try to change your Facebook password by applying those security steps.

4.5 Make a report for the above job.

5. Install antivirus software and scan computer system with the software.

5.1 Open your computer.

5.2 Using web browser download a free antivirus software such as Avast, Avira etc.

5.3 Install the antivirus software.

5.4 Scan your computer with the antivirus software.

5.5 Make a report for the above job.

6. **Install firewall to a computer system and prevent the computer system from intruder.**

6.1 Open your computer

6.2 Find your computer for any firewall.

6.3 Go to Control Panel and protect your PC with Windows firewall.

6.4 Turn Windows firewall on and off.

6.5 Make a report for the above job.

7. **Use a hashing program to verify the integrity of data with HashCalc program.**

7.1 Open your computer

7.2 Create a .txt file.

7.3 Download HashCalc from web and install the software.

7.4 Calculate a hash of the Hash.txt file

7.5 Make a change to the Hash.txt file

7.6 Calculate a new hash of the Hash.txt file

7.7 Make a report for the above job.

8. **Practice to sending Confidential Information over Email utilizing WinZip.**

8.1 Open your computer.

8.2 Create a MS Word file named Confidential Document.docx and encrypt the file by WinZip with a strong password.

8.3 E-mail the encrypted file to your friend.

8.4 Send the password of the file to your friend by mobile phone and tell him to open the file using the password.

8.5 Make a report for the above job.

REFERENCES:

1. Cyber Security Essentials - CRC Press
2. হ্যাকিংয়ের গোলকধাঁধাঁ – দিলোয়ার আলম , মনিরুজ্জামান
   সাইবার নিরাপত্তা ও তথ্য প্রযুক্তি ব্যবহারে সতর্কতা – শ্যামসুন্দর সিকদার

Optional Subject-II

5.	**Network Maintenance Group**	Option-II	66676	Network Security System
6.	**Automation System Group**	Option-II	66677	Embedded System Design
7.	**Software Developer Group**	Option-II	66678	Advanced Database Management System
8.	**Multimedia Developer Group**	Option-II	66679	Game Development

NETWORK SECURITY SYSTEM

AIMS

- **To be able to understand computer network and information security.**
- **To be able to learn why network security is important**
- **To be able to explain network security prevention, detection and response.**
- **To be able to define and explain the concept of network confidentiality, information integrity, network availability, network auditability.**
- **To be able to understand management's role in the development, implementation and maintenance of network security.**
- **To be able to understand security architecture, it's principles, components and employment.**
- **To be able to understand the relationship between risks, threats, vulnerabilities and countermeasures.**
- **To be able to understand the need for constantly evaluating the status of security management.**
- **To be able to understand the difference between policies, procedures, standards, guidelines, encryption, cryptography terms, firewalls.**
- **To be able to understand operation of Virtual Private Networks, importance of authentication and the characteristics of a good password.**

SHORT DESCRIPTION

Network and information security, network security prevention, detection and response, the concept of network confidentiality, information integrity, network availability, network auditability, security architecture, relationship between risks, threats, vulnerabilities and countermeasures, policies, procedures, standards, guidelines, encryption, cryptography terms, firewalls, Operation of Virtual Private Networks, authentication and the characteristics of a good password.

DETAILS DESCRIPTION
Theory:
1. Understand Security Basics
    1.1 Define Computer Security.
    1.2 Mention OSI Security Architecture.
    1.3 Describe various threats and attacks.
    1.4 Explain Security Services.
    1.5 State Security Mechanisms (X.800).
    1.6 Describe a model for network security.

2. Understand network application protocol
    2.1 Define network application protocol.
    2.2 Describe various application protocols.
    2.3 Mention DNS, TFTP, FTP, HTTP, SSL and its application.
    2.4 Describe SNMP, SMTP, NTP, SSH, RDEP, and its application.
    2.5 State the necessity of protocols in connectivity devices.

3. Understand network security protocols
3.1 Define authentication, authorization and accounting.
3.2 Describe authentication, authorization and accounting of AAA Server.
3.3 Define TACACS+ and RADIUS
3.4 Mention the encryption technology overview.
3.5 State DES, 3DES, AES, MD5, SHA, IPsec protocols.
3.6 Describe Diffie- Hellman technique.

4. Understand Security Technologies
4.1 Define NAT and PAT.
4.2 Describe FIREWALL and public key infrastructure.
4.3 Describe the Virtual Private Network (VPN).
4.5 State network based IDS and host based IDS in Firewall technique.
4.6 State various types of VPN.
4.7 Describe the VPN Connectivity with block diagram.

5. Understand Digital Signatures.
5.1 Define Digital Signatures.
5.2 State the classification of Digital Signatures.
5.3 Describe Symmetric-Key Signatures.
5.4 Describe Public-Key Signatures.
5.5 Describe Cryptography and Ciphers.

6. Understand layer 2 securities
6.1 Define VLAN, Trunking.
6.2. Mention the native VLAN
6.3 Describe inter-VLAN routing in layer 3 switch.
6.4 Explain Spanning Tree Protocol in Layer 2 device.
6.5 Describe RSTP, MSTP, and PPP authentication.
6.6 Describe VLAN Hoping, BPDU Guard and Root Guard.

7. Understand Email security, Web security and Social issues.
7.1 Define Email Security.
7.2 Describe Pretty Good Privacy (PGP)
7.3 Define Web Security.
7.4 Describe Secure Sockets Layer (SSL).
7.5 Define Mobile Code Security.
7.6 Define Privacy and Freedom of Speech.

8. Understand Layer 3 Security.
8.1 Define ACL, Standard and Extended, Named
8.2 State the DHCP Snooping
8.3 Define Fast Hop security
8.4 Describe user creating in router with privilege level 15.
8.5 Explain VTY and console port security with user name.

9. Understand Network Security Applications.

9.1 Define Kerberos

9.2 Define X.509 Certificates.

9.3 Define HTTPS.

9.4 Describe Wireless Application Protocol.

10. Network Security policies and protections

10.1 Define Security Policy.

10.2 Define Network Protection

10.3 State Standard Bodies and Incident Response teams

10.4 Describe Incident Response teams and Internet News groups.

10.5 Describe Vulnerabilities, Attacks and common Exploits

10.6 Mention Internet Distribution System (IDS).

Practical:

1. Identify different types of Network Devices (Switch, Router) and observe their constructional features.

2. Establish a Peer to Peer/Workgroup LAN

(a) Install Network Interface Card (NIC) into the PC

(b) Check the MAC address of the Network Interface Card (NIC)

(c) Connect cable connector with PC & Hub/Switch

(d) Configure the TCP/IP Protocol in each PC

(e) Test the connectivity of the PCs

3. Perform the task to Work with a Peer/Workgroup LAN environment for simple data communication.

(a) Share the folders / secondary memory.

(b) Share a printer or any other resources.

(c) Create User on each PC and set user name and password.

(d) Observe advanced protocols such as- IMAP3, SMTP, POP3, HTTP and HTTPS.

4. Establish a Client–Server Local Area Network

(a) Install Windows server 2012 into a server PC

(b) Configure TCP/IP to server and client PCs

(c) Perform the task to configure the Active Directory –Directory Service (AD-DS)

(d) Set Firewall security in Server and PCs.

5. Perform the task to configure The DNS in Windows Server 2012.

6. Perform the task to configure the DHCP in Windows Server 2012

7. Develop a real time client-server environment to use network security protocol and perform the following

a) Configure Router as DHCP server and set Local User Name and Password for router access.

b) Create two VLAN in a Layer 2 switch.

c) Ensures two VLAN communicates each other.

d) Primary& Secondary connection between two switches to ensure redundancy via STP.

8. Configure DNS and Mail server for local users and ensure that user can send & receive mails.

9. Use PPP Connection between ISP and Router so that Local user can access internet.

10. Apply following security and policy on Router and Switch.

a) Telnet and SSH configuration on Router and switch. So that Administrator can able to access the devices remotely.

b) Ensure port security to block the unauthorized access of switch ports.

REFERENCE BOOK

1. Network Security Essentials,
   By -William Stallings
2. Computer Networks
   – Tanenbaum and Wetherall
3. CCNA Routing & Switching Study Guide
   By- Todd Lammle

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66677   **Embedded System Design**   **T P C**
                                                                           2 3 3

AIMS
To develop knowledge and skill on programming and interfacing of embedded systems using Microcontroller.

SHORT DESCRIPTION
The embedded system features, architecture, programming and the real world interfacing.

DETAIL DESCRIPTION
THEORY:

1. Understand the Embedded System
   1.1. Describe embedded system
   1.2. List major components of an embedded system
   1.3. List the main features of embedded system
   1.4. Describe the architecture of embedded system
   1.5. State the application fields of embedded system
   1.6. List some OS and RTOS for embedded system

2. Understand embedded system development kit
   2.1. Identify the difference between microcontroller and single board microcontrollers (Arduino / PICduinoetc.)
   2.2. Identify the difference between single board microcontrollers and single board computer (Raspberry Pi etc.)
   2.3. List different types of software development tools for embedded system
   2.4. Describe different items of embedded system development environment
   2.5. List different types of hardware development tools for embedded system
   2.6. Describe the different features of Embedded system development kit
   2.7. List the different manufacturers of microcontroller based development kit (like Arduino) or microprocessor based development kit (like Raspberry Pi)

3. Understand the interfacing among different component of embedded system
   3.1. List interfacing method for different component of embedded system.
   3.2. Distinguish serial communication and parallel communication
   3.3. Identify the advantage of interrupt driven I/O interfacing
   3.4. Describe SPI, I2C, UART/USART, CAN
   3.5. Describing LCD unit interfacing technique
   3.6. Describe key-pad interfacing technique

4. Understand the modules used in Embedded system
   4.1. Describe BLE module used in embedded system to communicate with smart phone or smart devices
   4.2. Describe Zigbee module used an embedded system for sensor network
   4.3. Describe RTC with built-in battery module
   4.4. Describe Wifi-Module used in embedded system
   4.5. Describe RF module used in an embedded system
   4.6. Describe DC-to-DC converter

5. Understand the interfacing of embedded system with external devices
   5.1. Describe USB, Ethernet, RS-232/RS-423
   5.2. Mention the difference between RS-232 and RS-423

5.3. Describe IR, BT, BLE, WiFi, Zigbee

5.4. Mention the difference between BT and BLE

5.5. Describe mass storage using USB

6. Understand different memory system of embedded system

6.1. Describe serial EEPROM in an embedded system

6.2. Describe serial flash memory in an embedded system

6.3. Mention the difference between serial EEPROM and serial flash memory

6.4. Describe SD cardin an embedded system

7. Understand sensor interfacing in embedded system

7.1. Define sensors and describe the reason of using sensors

7.2. Describe the features of sensors and describe different types of sensors

7.3. Describe touch screen, MIC, speaker, buttons, temperature sensors, light sensors, metal detectors, proximity sensors and most common sensors used in embedded systems

7.4. Describe the use of different sensors for smart phone, smart home, smart watch, smart glass

7.5. Explain different interfacing systems of different sensors

8. Understand actuators interfacing in embedded system

8.1. Define actuators and describe the reason of using actuators

8.2. Describe the features of actuators and describe different types of actuators

8.3. List different actuators used in an embedded system

8.4. Describe the different actuators used for smart home, humanoid robot, industrial robot, ATM machine

8.5. Describe different types of motor used in embedded system

8.6. Explain different interfacing of different actuators

9. Understand the Embedded Development Life Cycle

9.1. Describe EDLC

9.2. Describe different steps of EDLC

9.3. Describe different software tools used for different steps EDLC

9.4. Describe auto update feature of an embedded system

9.5. Describe QA and testing of embedded system

10. Understand the features of advance embedded system

10.1. Describe ARM architecture

10.2. Identify different ARM series for different type of application

10.3. List the reason for using different clock source of a microcontroller

10.4. List the different features of PIC series High-end and enhanced microcontroller

10.5. Describe FPGA

10.6. Describe SoC

10.7. Define IoT and describe IoT eco system

10.8. Design an abstract model of an smart phone

PRACTICAL:

1. Perform the construction of an embedded system project that has key pad

1.1. Design the schematic diagram

1.2. Develop the program in C language or Assembly language that can detect specific key pressed by user

1.3. Build the hex/bin file of the program

1.4. Simulate the program

1.5. Flash the hex/bin file into MCU

1.6. Construct the circuit and observe the operation
1.7. Debug the program
1.8. Collect the case/box for packing the project
1.9. Packaging the circuit in the case/box
1.10. Make report on the project and perform the presentation of the project output

2. Perform the construction of embedded system project that uses I2C for serial EEPROM interfacing
2.1. Design the schematic diagram
2.2. Develop the program
2.3. Build the hex/bin file of the program
2.4. Simulate the program
2.5. Flash the hex/bin file into MCU
2.6. Construct the circuit and observe the operation
2.7. Debug the program

3. Perform the construction of an embedded system project that uses SPI for interfacing temperature sensor, RF transceiver or any other module
3.1. Design the schematic diagram
3.2. Develop the program
3.3. Build the hex file
3.4. Simulate the program
3.5. Flash the hex file into MCU
3.6. Construct the circuit and observe the operation

4. Perform the construction of an embedded system project that uses UART to output debug information
4.1. Design the schematic diagram
4.2. Develop the program
4.3. Build the hex file
4.4. Simulate the program
4.5. Flash the hex file into MCU
4.6. Construct the circuit and observe the operation

5. Perform the construction of an embedded system project that has a wireless communication module, for example, Wi-Fi module, BLE module, RF module, IR module for communication
5.1. Design the schematic diagram
5.2. Develop the program
5.3. Build the hex file
5.4. Simulate the program
5.5. Flash the hex file into MCU
5.6. Construct the circuit and observe the operation

6. Perform the construction of an embedded system that uses USB for communication
6.1. Design the schematic diagram
6.2. Develop the program
6.3. Build the hex file
6.4. Simulate the program
6.5. Flash the hex file into MCU
6.6. Construct the circuit and observe the operation

7. **Perform the construction of an embedded system to control the direction and steps of a stepper motor**
   7.1. Design the schematic diagram
   7.2. Develop the program
   7.3. Build the hex file
   7.4. Simulate the program
   7.5. Flash the hex file into MCU
   7.6. Construct the circuit and observe the operation

8. **Perform the construction of an embedded system to control the speed of a DC motor**
   8.1. Design the schematic diagram
   8.2. Develop the program
   8.3. Build the hex file
   8.4. Simulate the program
   8.5. Flash the hex file into MCU
   8.6. Construct the circuit and observe the operation

9. **Perform the construction of an embedded system that uses internal ADC for temperature sensor or any other analog sensors interfacing**
   9.1. Design the schematic diagram
   9.2. Develop the program
   9.3. Build the hex file
   9.4. Simulate the program
   9.5. Flash the hex file into MCU
   9.6. Construct the circuit and observe the operation

10. **Perform the construction of an embedded system to count pulses using internal counter**
    10.1. Design the schematic diagram
    10.2. Develop the program
    10.3. Build the hex file
    10.4. Simulate the program
    10.5. Flash the hex file into MCU
    10.6. Construct the circuit and observe the operation

11. **Perform the construction of an embedded system that uses Op-Amp to interface with LDR (Light dependent resistor)**
    11.1. Design the schematic diagram
    11.2. Develop the program
    11.3. Build the hex file
    11.4. Simulate the program
    11.5. Flash the hex file into MCU
    11.6. Construct the circuit and observe the operation

12. **Make a project of an embedded system that has LCD, serial EEPROM, temperature sensor and key pad**
    12.1. Design the schematic diagram
    12.2. Develop the program
    12.3. Build the hex file
    12.4. Simulate the program

12.5. Flash the hex file into MCU

12.6. Construct the circuit and observe the operation

12.7. Collect the case/box for packing the project

12.8. Packaging the circuit in the case/box

12.9. Make report on the project and perform the presentation of the project output

13. Perform the construction of an embedded system by using Arduino to generate timing pulse using internal timer of microcontroller

13.1. Develop the program

13.2. Download the program

13.3. Run the program

REFERENCE WEB ADDRESS AND BOOKS

1. http://www.microchip.com

2. www.st.com

3. www.ti.com

4. https://www.arm.com/

5. https://www.raspberrypi.org/

6. https://www.arduino.cc/

7. User Manual for MCU Training Kit - http://www.MicroProcessorInstitute.org

66678	***Advanced Database Management System***	**T P C**
		2 3 3

AIMS

- To be able to acquire the knowledge and skill in the Relational and XML Database.
- To be able to acquire the knowledge and skill in the Normalization & Query Optimization
- To be able to acquire the knowledge and skill in the Transaction and Concurrency control.
- To be able to acquire the knowledge and skill in the Crash Recovery and Backup, Security and Privacy.
- To be able to acquire the knowledge and skill in the Parallel and Distributed Databases, Mobile & Intelligent Databases, Object Oriented DBMS, Database applications.

SHORT DESCRIPTION

Relational and XML Database, Normalization, Query Optimization, Transaction and Concurrency control, Crash Recovery and Backup, Security and Privacy, Parallel and Distributed Databases, Mobile & Intelligent Databases, Object Oriented DBMS, Database applications.

Detail Description

Theory:

1. Recall the concepts of advanced database system
  1.1 Recall the purpose of Database and Need for DBMS
  1.2 Identify Database Users
  1.3 Compare 3-tier and 2-tier architecture of DBMS
  1.4 Prepare 3-tier architecture of DBMS and mention its advantages over 2-tier
  1.5 Define Data Independence
  1.6 Describe the Advantages and Disadvantages of different Database Management systems
  1.7 Distinguish among DBMS, RDBMS, Distributed and Centralized DB
  1.8 Describe Information Retrieval, Data Warehousing, Data Mining

2. Understand the Relational and XML Database
  2.1 Define constraints and Indexes
  2.2 Define XML Data Model, DTD, XML Schema
  2.3 Define Web Databases
  2.4 Explain Codd's rules
  2.5 Describe Database Design – ER to Relational
  2.6 Explain Functional dependencies
  2.7 Describe Loss less joins and dependency preserving decomposition

3. Understand the Normalization
  3.1 Define Functional Dependency
  3.2 Explain Anomalies in a Database
  3.3 Describe the normalization process: Conversion to first normal form, Conversion to second normal form, Conversion to third normal form
  3.4 Describe the Boyce-code normal form (BCNF)
  3.5 Explain Normalization (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF)
  3.6 Explain Normal forms based on primary keys
  3.7 Describe Denormalization process against a Normalized Database.

4. Understand the Query Execution and Optimization

    4.1 Identify Algorithm for Executing Query Operations: External sorting, Select operation, Join operation, PROJECT and set operation

    4.2 Explain Aggregate operations, Heuristics in Query Optimization, Semantic Query Optimization

    4.3 Converting Query Tree to Query Evaluation Plan

    4.4 Explain multi query optimization and application

    4.5 Describe efficient and extensible algorithms for multi-query optimization

    4.6 Explain execution strategies for SQL sub queries

    4.7 Explain Query Processing for SQL Updates

    4.8 Illustrate video preprocessing for content representation and indexing

    4.9 Explain image and semantic-based query processing

5. Understand the Transaction and Concurrency control

    5.1 Describe Concept of transaction and ACID properties

    5.2 Define Serializability

    5.3 States of transaction

    5.4 Define Concurrency control

    5.5 Illustrate Locking techniques

    5.6 Illustrate Time stamp based protocols

    5.7 Explain Granularity of data items

    5.8 Define Deadlock

6. Understand Crash Recovery and Backup

    6.1 Describe Failure classifications

    6.2 Define Storage structure

    6.3 Explain Recovery and atomicity

    6.4 Define Log base recovery

    6.5 Describe Recovery with concurrent transactions

    6.6 Illustrate Failure with loss of Non-Volatile storage

    6.7 Explain Database backup & recovery from catastrophic failure

    6.8 Define Remote Backup System

7. Understand Security and Privacy

    7.1 Define Database security issues

    7.2 Design principles for active rules

    7.3 Describe Discretionary access control based on grant and revoking privilege

    7.4 Illustrate Mandatory access control and role based access control for multilevel security

    7.5 Define Encryption and public key infrastructures

    7.6 Identify the Protection Management of Database Systems from the theft and damage to Hardware and Software

    7.7 Identify the Protection Management of Database Systems from the disruption and misdirection of the services they provide

8. Understand Parallel and Distributed Databases

    8.1 Define Centralized, Parallel and Distributed Database Systems.

    8.2 Explain the Centralized and Client-Server Architectures.

    8.3 Define Server System Architectures

    8.4 Define Inter and Intra Operation Parallelism

    8.5 Describe I/O Parallelism – Inter and Intra Query

    8.6 Illustrate Parallel Systems- Distributed Systems – Parallel Databases

    8.7 Define Distributed Database Concepts

8.8 Describe Distributed Database Storage and Transactions

8.9 Explain Distributed Query Processing

8.10 Sketch Three Tier Client Server Architecture

9. Understand Object Oriented DBMS Overview of object

9.1 State Object identity

9.2 Define Object Oriented paradigm

9.3 Explain OODBMS architectural approaches

9.4 Define procedures and encapsulation

9.5 Explain Object oriented data model

9.6 Define relationship, identifiers, Basic OODBMS terminology, Inheritance, Basic interface and class structure

9.7 Classify hierarchies and inheritance

9.8 Classify extents and persistent programming languages

9.9 Describe OODBMS storage issues

10. Understand Mobile & Intelligent Databases

10.1 Define Location and Handoff Management

10.2 Describe Effect of Mobility on Data Management

10.3 Define Location Dependent Data Distribution

10.4 Describe Mobile Transaction Models

10.5 Explain Transaction Commit Protocols

10.6 Explain Mobile Database Recovery Schemes

10.7 Mention the Active databases, Deductive Databases, Knowledge bases & Multimedia Databases

10.8 Explain Multidimensional Data Structures

10.9 Define Image Databases, Text/Document Databases

11. Case Study on Database applications

11.1 State real time buffer management.

11.2 Define active database

11.3 Classify SQL Server, starburst, oracle, PostgreSQL, DB2, chimera

11.4 Applications of active database

11.5 Define temporal database

11.6 Explain special, text and multimedia database

11.7 Explain Video and Audio Databases

11.8 Explain storage management for video

11.9 Demonstrate Multimedia Database Design

PRACTICAL:

1. Apply Normalization (1NF, 2NF and 3NF) on result process database.
2. Perform the task to view Stored procedure
3. Perform the task to view Join concept such as Simple, equi, non equi, self, outer join
4. Perform the task to Primary introduction to DBA User create, granting privileges(Grant, Revoke, Commit, Rollback, Save point)
5. Perform the task to view for Executing Query Operations: External sorting PROJECT and set operation
6. Perform the task to view Aggregate operations, Heuristics in Query Optimization, Semantic Query Optimization
7. Perform the task to view Database backup & recovery from catastrophic failure

8. Perform the task to show Encryption & Decryption Process
9. Perform the task to show Distributed Query Processing
10. Demonstrate Multimedia Database Design
11. Create Login for Users with proper permissions for a Database.
12. Query between two database tables and show the output view.
13. Create scheduled backup for database.
14. Restore backup for database.

TEXT/REFERENCE BOOKS:

1. Henry F Korth, Abraham Silberschatz and S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.
2. C. J. Date, A. Kannan and S. Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
3. R. Elmasri, S. B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
4. Database Management Systems Bipin Desai
5. James Martin, "Principles of Database Management Systems", 1985, Prentice Hall of India, New Delhi
6. "Database Management Systems", Arun K. Majumdar, Pritimay Bhattacharya, Tata McGraw Hill
7. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
8. Successful projects in ACCESS   - P. M Heathcote

66679   **Game Development**   **T P C**
                                                                     2 3 3

OBJECTIVE
After Completing this course students should be able to-
- Able to design and develop basic 2D Game in Unity Platform.
- Able to design and develop game prototype.
- Able to design and develop basic 3D game in Unity Platform.

COURSE PRE-REQUISITE
- Completed Course on Mathematics consisting, Basic Geometry, Coordinate System (2D, 3D), Angle, Circle, Basic Calculus
- Completed Course on C# and Object Programming or, Course on JavaScript
- Completed Course on Physics, consisting collision, motion etc.

SHORT DESCRIPTION
This course is designed to prepare students for booming game industry, this course is a basic game development course focusing basic game development using latest Unity Tool, which needed Basic C# and Object Oriented Programming. This course will cover – concept on Coordinate System, State Machine, Basic Computer Graphics, Developing Game using Unity Platform.

DETAIL DESCRIPTION
Theory

1. Revisit Object Oriented Programming in C#
1.1. Revisit Class Create and Properties Against Class
1.2. Revisit Aggregation Relationship between objects.
1.3. Revisit Inheritance Relationship, Up casting, Down casting
1.4. Revisit Polymorphism using Inheritance Relationship
1.5. Revisit Interface in C#

2. Concept on event programming and Threading in C#
2.1. Define Event
2.2. Describe Event Programming Mechanism
2.3. Define Threading, Multi-threading, Job
2.4. Describe Job Scheduling
2.5. Describe Running Long Process in Background

3. Review Coordinate System (2D and 3D)
3.1. Define Co-Ordinate System
3.2. Describe 2D Co-ordinate
3.3. Define 3D Coordinate System
3.4. Describe Components in 3D Coordinate System

4. Review Geometry concepts on line and Various Shapes
4.1. Define Line and Describe Calculation mechanism and equations to draw a line.
4.2. Define Circle and Describe calculation mechanism and equation to draw a circle.

5. Review Concepts Collision and Motion between objects.
5.1. Define Collision and Describe Collision identification concepts.
5.2. Define Motion and Motion Calculation for object.

6. State Machine
6.1. Define State Machine
6.2. Describe the necessity of writing a state machine for game programming
6.3. Describe the State Machine creation process and considerations.

7. Basic computer graphics (drawing lines, shapes, etc.)
7.1. Define Pixel, Vertices, Edge
7.2. Define Matrix and describe how to draw a matrix in computer graphics.
7.3. Describe Line Drawing in a Matrix.
7.4. Describe Circle Drawing in a Matrix.

8. Game-style physics (collisions, faked gravity, etc).
8.1. Describe collision management in game development
8.2. Describe how gravity is managed in game development
8.3. Describe motion in game development.

9. Basics of Frame Animation.
9.1. Define Frame and describe the necessity of frame in animation
9.2. Define and Describe timeline for frame animation.
9.3. Define and describe the process of making a frame animation.

10. Understanding on Graphics Illusions.
10.1. Define and Describe how graphics illusions is managed in game development
10.2. Define and describe perspective projection for 3D game development.
10.3. Define and describe various graphic illusion created for 2D game development.

11. Game Story Development
11.1. Describe the process of creating story against a idea of game development.
11.2. Describe the process of story sketch.
11.3. Describe the process of creating state machine for game story.

PRACTICAL

1. Getting Started with Unity
1.1. Download and install Unity from unity3d.com
1.2. Familiarize with Asset Workflow of Unit Tool
1.3. Familiarize with Unity Main Windows – The Scene Window, Game Window, Hierarchy Window, Inspector Window
1.4. Familiarize with Toolbar and components of Tool Bar.
1.5. Familiarize with Unity Tools and Features.

2. Develop 2D Game
2.1. Brainstorm and Create a Game Story for flappy bird (https://en.wikipedia.org/wiki/Flappy_Bird) like game.
2.2. Make State Machine For the Story Components.
2.3. Create Sprites using Sprite Creation tool in Unity

2.4. Render Sprites with Sprite Renderer in Unity like Color, Masking, Texture Providing
2.5. Create Script on C#/JavaScript on various keyboard input for various states according to state machine.
2.6. Create Scripts for various events regarding states according to state machine.
2.7. Use Box Collider and various Physics Collider features from Unity for collision management for the sprites.
2.8. Add Audio Effects and Background tracks for the game on various events

3. Develop a 3D Game

3.1. Brain Storm and Create a 3D Game Story
3.2. Create State Machine your game story.
3.3. Create Player Controller
3.4. Create Enemy Controller
3.5. Create Camera Controller
3.6. Setup World Collision for your game story.
3.7. Make prototypes
3.8. Create and Import Models using Model importing workflows.
3.9. Explore various Physics Colliding Features in Unity.
3.10. Write scripts for various events against key input.
3.11. Add Audio Effects against game.

ONLINE REFERENCE
- Unit3d.com

BOOK REFERENCE
- Game Programming Patterns by Robert Nystrom
- Game Coding Complete, Fourth Edition by Mike McShaffryDavid Graham
- Game Engine Architecture By Jason Jason Gregory

65853   **INNOVATION & ENTREPRENEURSHIP**   **T   P   C**
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AIMS
• To be able to understand the concept of entrepreneurship & entrepreneur.
• To be able to understand the concept of environment for entrepreneurship.
• To be able to understand the sources of venture ideas in Bangladesh.
• To be able to understand the project selection.
• To be able to understand business planning.
• To be able to understand the insurance and premium.
• To be able to understand the MDG & SDG.

SHORT DESCRIPTION
Concepts of entrepreneurship & entrepreneur; Entrepreneurship & economic development; Environment for entrepreneurship; Entrepreneurship in the theories of economic growth; Sources of ventures ideas in Bangladesh; Evaluation of venture ideas; Financial planning; Project selection; Self employment; Entrepreneurial motivation; Business plan; Sources of assistance & industrial sanctioning procedure; Concept of SDG; SDG 4,8 .

DETAIL DESCRIPTION

Theory :
1. Understand the basic concept of entrepreneurship & entrepreneur.
> 1.1 Define entrepreneurship & entrepreneur.
> 1.2 Discuss the characteristics and qualities of an entrepreneur.
> 1.3 Mention the classification of entrepreneur.
> 1.4 Discuss the necessity of entrepreneurship as a career.
> 1.5 Discuss the prospect of entrepreneurship development in Bangladesh.

2. Understand the concept of entrepreneurship and economic development.
> 2.1 Define economic development.
> 2.2 Discuss the economic development process.
> 2.3 Discuss the capital accumulation or rate of savings.
> 2.4 Discuss the role of entrepreneur in the technological development and their introduction into production Process.
> 2.5 Discuss the entrepreneur in the discovery of new product.
> 2.6 Discuss the discovery of new markets.

3. Environment for entrepreneurship development:
> 3.1 Define the micro environment.
> 3.2 Discuss individual income, savings and consumption.
> 3.3 Define macro environment.
> 3.4 Discuss political, socio-cultural, economical, legal and technological environment.
> 3.5 Difference between micro and macro environment .

4. Understand the concept of entrepreneurship in the theories of economic growth.
> 4.1 Define entrepreneurship in the theories of economic growth.
> 4.2 Discuss the Malthusian theory of population and economic growth.
> 4.3 Discuss the stage theory of growth.
> 4.4 Discuss the Schumpeterian theory of economic development.
> 4.5 Discuss the entrepreneurship motive in economic development.

5. Understand the sources and evaluation of venture ideas in Bangladesh.

5.1 Define sources of venture ideas in Bangladesh.
5.2 Discuss different types of sources of venture ideas in Bangladesh.
5.3 Define evaluation of venture ideas.
5.4 Discuss the factors that influence the selection of venture idea.

6. Understand the concept of project selection and financial planning.

6.1 Define project.
6.2 Discuss the idea of project.
6.3 Describe the guide lines for project ideas.
6.4 Discuss the sources of project ideas.
6.5 Discuss the evaluation of project ideas.
6.6 Describe the technical aspect of project.
6.7 Define financial planning.
6.8 Discuss the long term financial plan.
6.9 Discuss the short term financial plan.

7. Understand the concept of self employment.

7.1 Define self employment.
7.2 Describe different types of employment.
7.3 Describe the importance of business as a profession.
7.4 Discuss the reasons for success and failure in business.

8. Understand the business plan and the concept of the environment for entrepreneurship.

8.1 Define business plan.
8.2 Describe the importance of business plan.
8.3 Discuss the contents of business plan.
8.4 Define environment of business.
8.5 Describe the factors which effect environment on entrepreneurship

9. Understand the concept of sources of assistance & industrial sanctioning procedure.

9.1 Define sources of assistance.
9.2 Describe different types of sources of assistance.
9.3 Discuss the aid of sources.
9.4 Discuss the industrial policy.
9.5 Define foreign aid.

10. Understand the insurance and premium.

10.1 Define insurance and premium
10.2 Describe the essential conditions of insurance contract.
10.3 Discuss various types of insurance.
10.4 Distinguish between life insurance and general insurance.

11. Understand the concept of Sustainable Development Goals (SDG)

11.1   Define Sustainable development
11.2   State UN targets of MDG
11.3   State UN targets of SDG
11.4   Describe the importance of SDG
11.5   Explain the objectives of SDG
11.6   State the Challenges to achieve SDGs
11.7   Explain the actions to face the challenges of SDGs
11.8   State the of 7th 5 years plan
11.9   Mention the link of 7th 5 years plan with SDGs
11.10 Write down the 5 ps of sustainable development goals

12. Understand SDG 4,8 and 17

     12.1 Describe SDG 4 and its targets

     12.2 State the elements of Quality education for TVET

     12.3 Describe the gender equality and equal access of TVET for economic growth

     12.4 Describe SDG 8 and its targets

     12.5 Explain Green development, Green Economy, Green TVET & Green Jobs

     12.6 Explain the role an entrepreneur for achieving SDG

Reference book :

1. A hand book of new entrepreneur-by p.c jain.

2.A manual on business opportunity Identification and selection-by j.B patel and S S modi.

3.Uddokta unnoyan Nirdeshika -Md.Sabur khan.

4.Entrepreneurship- bashu and mollik.

5.Business Entrepreneurship-kage faruke.

6. Website, Youtube and Google