# GOVERNMENT POLYTECHNIC, NAGPUR.

**(An Autonomous Institute of Govt. of Maharashtra)**

## COURSE CURRICULUM

| | | |
|---|---|---|
| **PROGRAMME** | **:** | **DIPLOMA IN COMPUTER ENGINEERING** |
| **LEVEL NAME** | **:** | **PROFESSIONAL COURSES** |
| **COURSE CODE** | **:** | **CM408E** |
| **COURSE TITLE** | **:** | **COMPUTER SECURITY** |
| **PREREQUISITE** | **:** | **Nil** |
| **TEACHING SCHEME** | **:** | **TH: 03; TU: 00; PR: 00(CLOCK HRs.)** |
| **TOTAL CREDITS** | **:** | **03 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)** |
| **TH. TEE** | **:** | **03 HRs** |
| **PR. TEE** | **:** | **NIL** |
| **PT** | **:** | **01 HRs** |

### ❖ RATIONALE:

Engineering students must be able to use basics of computer and its security in real time environment. This course increases student's ability towards troubleshooting the problems occurred regarding security of computer and its network. It also describes basics of attacks occurred over the computer in the network. The algorithms regarding security measures are also learned by the student to protect their computer over the internet.

### ❖ COURSE OUTCOMES:

**After completing this course students will be able to–**

1. Justify the solutions for real world problems regarding security of computer.
2. Select and apply appropriate algorithms to make system more secured.
3. Solve the risks faced by Computer Systems and the nature of common information hazards.
4. Build systems that are more secure against attacks.
5. Apply concept of computer security for real time problems.
6. Develop various cryptography algorithms.

## ❖ COURSE DETAILS:

## A. THEORY :

| Units | Specific Learning Outcomes (Cognitive Domain) | Topics and subtopics | Hrs. |
|---|---|---|---|
| **1. Introduction to security** | 1. Describe need of computer security<br>2. State the importance of security<br>3. State security goals<br>4. State Hackers classification | 1.1 Define 'Secure' , Protecting Valuables, Characteristics of Computer Intrusion<br>1.2 Attacks – Vulnerabilities, Threats ,<br>1.3 Attacks and Controls Method, Motive, Opportunity<br>Malware: Viruses, Logic bombs<br>1.4 The Meaning of Computer Security - Security Goals , Computer criminals - Amateurs, Crackers or Malicious Hackers, Career Criminals, Terrorists<br>1.5 Method's of Defense - Hacking as Defense mechanism, The Methodology of Hacking , Classification of hackers & controls | **8** |
| **2. Operational Security** | 1. Define different terms related to physical security<br>2. Describe the various types of security Techniques<br>3. State security Policies<br><br>Application Level | 2.1 Role of people in security : Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized software/ hardware, Access by non employees. Security awareness, Individual user responsibilities Security policies, standards, procedures and guidelines<br>2.2 Physical security : Access controls<br>2.3 Biometrics : finger prints , hand prints , Retina detect patterns, voice patterns, signature and writing patterns, keystrokes,<br>2.4 Weak / Strong Passwords and Password Cracking , Insecure Network connections<br>2.5 Malicious Code<br>2.6 Programming Bugs<br>2.7 Cyber crime and Cyber terrorism | **10** |

| | | | |
|---|---|---|---|
| **3. Cryptography Fundamentals** | 1. Define cipher, encryption and decryption.<br>2. Describe the importance of cryptography<br>3. List the strategies of Encryption and Decryption<br>Application Level | 3.1. Plain Text and Cipher Text Substitution Technique Transposition Techniques Encryption and Decryption Symmetric and Asymmetric key Cryptography<br>3.2 Steganography<br>3.3 RSA Algorithm<br>3.4 DES Algorithm<br>3.5 AES Algorithm<br>3.6 Digital Signatures<br>3.7 Trust models : Hierarchical, Peer to Peer, Hybrid | **10** |
| **4. Security in system** | 1. State various private network<br>2. Describe types of firewall.<br>3. State the various types of Network security<br>4. Differentiate between different firewalls.<br>Application Level | 4.1 Network Concepts - The Network , Media , Protocols<br>4.2 Types of Networks Threats in Network What makes the Network Vulnerable? Categories of Attack<br>4.3 Firewalls : Define Firewall, Design of Firewall, Types of Firewalls , Personal Firewalls Comparison of Firewalls<br>4.4 Intrusion Detection System - Types of IDs, Goals for Intrusion Detection System , IDs strengths and Limitations<br>4.5 IP security - Overview , Architecture, IPSec configurations, IPSec security | **08** |
| **5. Network Security Controls** | 1. Describe the various types of System security<br>2. Define Kerberos, Honey Pot<br>Application Level | 5.1 Security Threat Analysis<br>5.2 Design and Implementation & Architecture<br>5.3 Encryption<br>5.4 Strong Authentication : One Time Password, Challenge Response System,<br>5.5 Kerberos, Honey Pots | **6** |
| **6. Security Administration** | 1. Define security planning.<br>2. Describe security Planning<br>3. State Factors for physical security | 6.1 Security Planning,<br>6.2 Contents of a Security Plan<br>6.3 Security Planning Team Members<br>6.4 Physical Security Natural disaster : Power Loss , Surge Suppressor , Human Vandals<br>6.5 Secure Email : Security for Email , Requirements and Solutions, Example Secure E-mail System. | **6** |
| | | **Total Hrs.** | **48** |

## ❖ SPECIFICATION TABLE FOR THEORY PAPER:

| Unit No. | Units | Levels from Cognition Process Dimension | | | Total Marks |
|---|---|---|---|---|---|
| | | R | U | A | |
| **01** | Introduction to Security | 02(02) | 08(04) | 00(00) | **10(06)** |
| **02** | Operational Security | 00(04) | 08(04) | 06(00) | **14(08)** |
| **03** | Cryptography Fundamentals | 02(00) | 08(04) | 06(06) | **16(10)** |
| **04** | Security in System | 00(00) | 08(00) | 06(06) | **14(06)** |
| **05** | Network Security Controls | 02(02) | 00(04) | 06(00) | **08(06)** |
| **06** | Security Administration | 04(00) | 04(04) | 00(00) | **08(04)** |
| | **Total** | **10(08)** | **36(20)** | **24 (12)** | **70 (40)** |

R – Remember U – Understand A – Analyze / Apply

## ❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

| Q. No | Bit 1 | | | Bit 2 | | | Bit 3 | | | Bit 4 | | | Bit 5 | | | Bit 6 | | | option |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | L | M | T | L | M | T | L | M | T | L | M | T | L | M | T | L | M | |
| **01** | 1 | R | 2 | 3 | R | 2 | 6 | R | 2 | 5 | R | 2 | 6 | R | 2 | 1 | R | 2 | **5/7** |
| | 5 | R | 2 | | | | | | | | | | | | | | | | |
| **02** | 2 | U | 4 | 1 | U | 4 | 3 | U | 4 | 5 | U | 4 | 2 | R | 4 | | | | **3/5** |
| **03** | 1 | U | 4 | 2 | U | 4 | 4 | U | 4 | 6 | U | 4 | 3 | U | 4 | | | | **3/5** |
| **04** | 3 | U | 4 | 4 | U | 4 | 6 | U | 4 | 2 | U | 4 | 1 | U | 4 | | | | **3/5** |
| **05** | 2 | A | 6 | 4 | A | 6 | 3 | A | 6 | | | | | | | | | | **2/3** |
| **06** | 3 | A | 6 | 5 | A | 6 | 4 | A | 6 | | | | | | | | | | **2/3** |

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

| | What | | To Whom | Frequency | Max Marks | Min Marks | Evidence Collected | Course Outcomes |
|---|---|---|---|---|---|---|---|---|
| **Direct Assessment Theory** | **CA** (Continuous Assessment) | PT | Students | Two PT (average of two tests will be computed) | 20 | -- | Theory Answer Scripts | 1, 2, 3, 4,5,6 |
| | | Class Room Assignments | | Assignments | 10 | -- | Assignment copy | 1, 2, 3, 4,5,6 |
| | **TEE** (Term End Examination) | End Exam | Students | End Of the Course | **70** | **28** | Theory Answer Scripts | 1, 2, 3, 4,5,6 |
| | | | | | **100** | **40** | | |
| **Direct Assessment Practical** | **CA** (Continuous Assessment) | ST | Students | -- | -- | -- | -- | -- |
| | | Journal Writing | | -- | -- | -- | -- | -- |
| | | | | -- | -- | -- | -- | -- |
| | **TEE** (Term End Examination) | End Exam | Students | -- | -- | -- | -- | -- |
| **Indirect Assessment** | Student Feedback on course | | Students | After First PT | Student Feedback Form | | | 1, 2, 3, 4,5,6 |
| | End Of Course | | | End Of The Course | Questionnaires | | | |

## ❖ SCHEME OF PRACTICAL EVALUATION:

| S.N. | Description | Max. Marks |
|---|---|---|
| NIL | | |

## ❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

| Course Outcomes | Program Outcomes (Pos) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 3 |
| 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 3 |
| 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 3 |
| 4 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 3 |
| 5 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 3 |
| 6 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 3 |

## ❖ REFERENCE & TEXT BOOKS:

| S.N. | Title | Author, Publisher, Edition and Year Of publication | ISBN Number |
|---|---|---|---|
| 1. | Cryptography and Network Security | Behrouz Forouzan, Tata-McGraw-Hill, 2nd Edition, 2010 | 13: 9780070702080 |
| 2. | Cryptography and Network Security-principles and practice | William Stallings, Pearson Publication, 6th Edition, 2013 | 13: 978-0131873162 |
| 3. | Cryptography and Network Security | Atul Kahate, Tata-McGraw-Hill, 3rd Edition, 2013 | 13: 9780070151451 |
| 4. | Security in Computing | Charles P.PFleeger, Dorling Kindersley Pvt.Ltd, 4th Edition, 2007 | 13: 978-0132390774 |

## ❖ E-REFERENCES:

www.cs.iit.edu/~cs549/lectures/CNS-1.pdf accessed on 14th September, 2016

nptel.ac.in/courses/106105031 accessed on 14th September, 2016

williamstallings.com/Extras/**Security**-Notes/ accessed on 14th September, 2016

*www.vssut.ac.in/lecture_notes/lecture1428550736.pdf* accessed on 14th September, 2016

## ❖ LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

| S.N. | Name | Designation | Institute / Industry |
|---|---|---|---|
| 1 | Mr. S. P. Lambhade | Head, Computer Engineering | Government Polytechnic, Nagpur. |
| 2. | Lekhraj D. Vilhekar | Lecturer in Information Technology | Government Polytechnic, Nagpur. |
| 3 | S. N. Chaudhary | Lecturer in Computer Engineering | Government Polytechnic, Nagpur. |
| 4 | G. B. Chavan | Lecturer in Computer Engineering | Government Polytechnic, Nagpur. |
| 5 | Shri. Atul Upadhyay | CEO | Vista Computers , Ram Nagar, Nagpur |
| 6 | Shri. N. V. Chaudhari | Asst. Professor (CSE) | DBACEO, Wanadongri, Nagpur |
| 7 | Shri. Manoj Jethawa | HOD Computer Science | Shri Datta Meghe Polytechnic, Nagpur |

**(Member Secretary PBOS)** **(Chairman PBOS)**