

ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार - शिक्षणमहर्षी डॉ. बापूजी साळुंखे
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur.

VIVEKANAND COLLEGE, KOLHAPUR

(An Empowered Autonomous Institute)

Affiliated to Shivaji University

NAAC Reaccredited "A+" CGPA 3.29 | College with Potential for excellence | ISO 9001:2015

Department of Computer Studies



NOTICE

Date: 09th December 2025

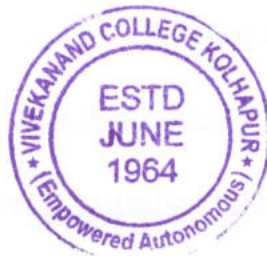
Open Book Test – Cyber Security

All MCA I Year students are hereby informed that **Open Book Test** for the subject **Cyber Security** will be conducted as per the details below. Students are requested to be present on time with proper preparation.

Test Details:

- ◆ **Date:** 10/12/2025
- ◆ **Time:** 11:00 PM to 12:00 PM
- ◆ **Venue** Room No. 512

Students have to report to the venue before the scheduled time.




Mr. V. B. Pujari
HEAD
DEPARTMENT OF M. C. A.
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur.

VIVEKANAD COLLEGE KOLHAPUR

DEPARTMENT OF COMPUTER STUDIES

OPEN BOOK TEST

Attendance Sheet

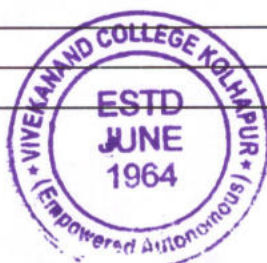
Subject-Cyber Security

Date-10/12/2025

MCA I (2025-26)

SEM-I

ROLL.NO	NAME OF STUDENT	SIGN
1	AMBOLE SWAPNIL AMAR	AB
2	ATIGRE PRATHMESH UMESH	A.T. Atigre
3	BABAR MINAL SACHIN	M.S. Babar
4	BABAR SANJANA SURESH	JS
5	SHRIRAM TUKARAM BATE	SRBate
6	CHOUTHE NIKITA SAMBHAJI	N.Chouthi
7	CHOUGALE MANALI BHIMRAO	M.Chougale
8	CHOUGULE TIRTHA AMIT	T.Chougule
9	DAHOTRE ADITYA DIVAKAR	A.Dahotre
10	DALVI SAKSHI VISHWAS	S.Dalvi
11	DAVANG PRANALI PANDURANG	P.Davang
12	DESAI KHUSHI MAINUDDIN	AB
13	DESAI SANDESH SUDHIR	AB
14	DESAI MAYURI RAVINDRA	M.Desai
15	DESAI ADITYA VILAS	AB
16	DHONUKSHE ROHAN NAMDEV	AB
17	DIVASE PRACHI PANDHARINATH	P.Divase
18	DIXIT VAISHNAVI UMESH	AB
19	DUBALE PRATHMESH DADASO	P.Dubale
20	EKAL PRUTHVIRAJ VISHWANATH	AB
21	GADKARI NAWAZ SALIM	Gadkari
22	GAIKWAD SHREYA SHIVAJI	Gaikwad
23	GAWADE VINAYAK AMRUT	V.Gawade
24	GOKHALE NEEL MAKARAND	N.Gokhale
25	GURAV VAISHNAVI SAMBHAJI	Gurav
26	HASABE SUSHANT VIKRAM	AB
27	HIREMATH ROHINI MANTESH	H.Mantesh
28	JADHAV MADHAV DHANAJI	AB
29	JADHAV SUDESHA GANESH	S.Jadhav
30	JAGTAP TANVI NITIN	AB
31	KADAM RAJ SHANKAR	AB
32	KADAM HARSHADA HINDURAO	H.Kadam
33	KADAM RUTUJA MARUTI	R.Kadam
34	KAMBALE SOURAV KRISHNAT	S.Kamble
35	KAMBLE KRANTI VITTHAL	K.Kamble
36	KAMBLE SANDIP SADASHIV	S.Kamble
37	KAMBLE VAISHNAVI NANASO	V.Kamble
38	KASHID SHRUTIKA PRAKASH	AB
39	KHADE PRITI SANJAY	P.Khade
40	KHANDEKAR VISHAL VILAS	V.Khade



41	KOTHMIRE SHIVAM KIRANRAO	AB
42	LOHAR PIYUSH PRAKASH	Lohar
43	MANDEKAR SOURABH VIJAY	Manekar
44	PARIT SALONI SHAHAJI	Parit
45	PARIT APARNA NAMDEV	Parit
46	PATIL PRATIK NAMDEV	AB
47	PATIL NANDINI SHRIKANT	Natli
48	PATIL ABHISHEK TANAJI	AB
49	PATIL SANDESH SHAHAJI	Patil
50	PATIL MADHURA MOHAN	Patil
51	PATIL PAYAL NAMDEV	Patil
52	PATIL SHRUTIKA BALWANT	Patil
53	PATIL ADITYA RANJIT	AB
54	PATKARE DIVYANGANA SANJAY	DS Patkar
55	POTDAR AISHWARYA VIJAY	@Potdar
56	POWAR SAYALI JAGANNATH	SPowar
57	POWAR SIDDHESH RUPESH	SPowar
58	PRASADE SMIT SAMEER	Prasad
59	SHIKALGAR ALSHIFA PARVEJ	Shik
60	SHINDE SAKSHI PANDURANG	Shinde
61	SINGH ROHAN UMACHARAN	AB
62	SURYAVANSHI VAISHNAVI VINAYAK	Vaish
63	SUTAR SHWETA SURESH	AB
64	VARUTE SAMRUDDHI BABURAO	Varute
65	WAINGADE SONIYA VIJAY	AB
66	YADAV PRANALI DHONDIRAM	Yadav
	FACULTY SIGN -	AB



(Mr. Vaishnav. V. Shegale)





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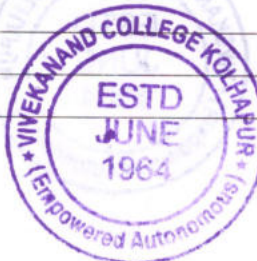
Department of Computer Studies

Date-10/12/2025

Subject-Cyber Security

Open Book Test - Marks

SR. NO.	NAME	Marks
1	AMBOLE SWAPNIL AMAR	AB
2	ATIGRE PRATHMESH UMESH	12
3	BABAR MINAL SACHIN	16
4	BABAR SANJANA SURESH	17
5	SHRIRAM TUKARAM BATE	18
6	CHOUTHE NIKITA SAMBHAJI	15
7	CHOUGALE MANALI BHIMRAO	16
8	CHOUGULE TIRTHA AMIT	17
9	DAHOTRE ADITYA DIVAKAR	13
10	DALVI SAKSHI VISHWAS	14
11	DAVANG PRANALI PANDURANG	13
12	DESAI KHUSHI MAINUDDIN	AB
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14	DESAI MAYURI RAVINDRA	16
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21	GADKARI NAWAZ SALIM	16
22	GAIKWAD SHREYA SHIVAJI	17
23	GAWADE VINAYAK AMRUT	15
24	GOKHALE NEEL MAKARAND	13
25	GURAV VAISHNAVI SAMBHAJI	13
26	HASABE SUSHANT VIKRAM	AB
27	HIREMATH ROHINI MANTESH	15
28	JADHAV MADHAV DHANAJI	AB
29	JADHAV SUDESHA GANESH	12
30	JAGTAP TANVI NITIN	AB



31	KADAM RAJ SHANKAR	AB
32	KADAM HARSHADA HINDURAO	15
33	KADAM RUTUJA MARUTI	16
34	KAMBALE SOURAV KRISHNAT	13
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63	SUTAR SHWETA SURESH	AB
64	VARUTE SAMRUDDHI BABURAO	15
65	WAINGADE SONIYA VIJAY	AB
66	YADAV PRANALI DHONDIRAM	13

V. V. V.
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 (EMPOWERED AUTONOMOUS)



V. V. V.
 Faculty Sign

(Mr. Vaishnav. V. shegale)

Open-Book Test

Lucky Page No.:

Date: / /

Name - Payal Namdev Patil

Std - MCA-I

Sub - Cyber security

Roll No - 51

Date - 10-12-2025

- Q1] Define cyberspace and explain the architecture of cyberspace in detail.
- Q2] Explain internet and world wide web (WWW). Also describe the advent of the internet.
- Q3] What is cyber security? Explain the major issues and challenges of cyber security.
- Q4] Describe the internet infrastructure for data transfer and governance. Also explain the role of internet society.

Q5]

→ Cyber security -

- The protection of information system against unauthorized access to or modification of information.

- Cyber security is nothing but protection of data

- Cyber security refers to the practice, technologies & process designed to protect computers, network data and systems from cyber attacks, unauthorized access, damage, or theft.

- Its goal is to ensure confidentiality, integrity & availability of information.

* Major issues and challenges -

① Increasing Number and Sophistication of cyber attacks -

Cyber threats are becoming more advanced, frequent and difficult to detect.

Examples -

① Malware

② Ransomware

③ Phishing

② Shortage of Cybersecurity Professionals -

- There is a global lack of skilled cybersecurity experts.

- Organizations struggle to find trained personnel to manage and secure systems.

③ Data Breaches and Privacy concerns -

A major challenge is preventing unauthorized access to sensitive data such as -

① Personal information.

② Financial data.

③ Intellectual property.

④ Cloud Security issues -

As more organizations store data in the cloud, challenges include.

① Misconfigured cloud settings.

② Unauthorized access.

③ Shared responsibility confusion between cloud providers and customers.

⑤ Evolving Ransomware Threats -

- Ransomware attacks encrypt company data and demand payment for recovery.
- Modern ransomware gangs operate like businesses with advanced tools and support networks.

⑥ Financial & Resource constraints -

many organizations, especially small businesses, lack:

- ① Advanced security tools.
- ② Dedicated cybersecurity teams.

This increases vulnerability to attacks.

Q7

→ Cyber Space -

- cyberspace is a virtual environment created by interconnected digital technologies, including computer network, the internet, communication systems, software, and data.

- It is the global domain where electronic communication, online interactions, data exchange & digital activities take place.

- Terms of cyberspace -

- ① Internet
- ② website & applications
- ③ cloud system
- ④ Social media
- ⑤ Computer networks
- ⑥ IoT devices
- ⑦ virtual and augmented reality environments

* Architecture of cyberspace

- cyberspace does not have a single physical structure. instead, it is built on multiple inter-connected layers.
- Most models describes cyberspace architecture using five main layers-

① Physical layer-

This is the hardware foundation of cyberspace. it includes -

- ① computer, servers, routers, switches.
- ② cables (fiber optics, copper wires)
- ③ wireless systems (Wi-Fi, cellular towers, Star satellites)
- ④ Data centers.
- ⑤ Power supply system

Function - Transmits digital signals through physical devices and infrastructure.

② Network layer-

This layer handles connectivity and communication between devices.

- Includes rules, protocols, and addressing system.

Example - ① IP addresses, DNS.

② TCP/IP protocol suite

③ Network routing & switching

- This layer ensures data flow, routing and communication across networks.

③ Information layer.

- contains the actual data stored and shared in cyberspace.

Examples - ① websites, files, documents, databases.

② Emails, videos, images.

③ Social media posts.

- Represents the content accessible to users.

④ User Layer -

- Refers to the people and organizations using cyber space.

Example - ① individuals, businesses, governments.

② Hackers, security professionals, administrators.

- Hackers, security

- Human interacts with systems and can be both the strongest and weakest link in cyber security.

05

⑤ Cognitive Layer -

- Represents the thoughts, behavior & decision-making of users.

Example - user awareness, social engineering

- cyber attackers often exploit this layer through phishing, scams, & misinformation.

Q2]

→

Internet and world wide web (WWW)

* Internet
- The Internet is a global network of inter connected computers and communication protocols - especially TCP/IP - to allow devices worldwide to share information.

* Features -

① Global connectivity - connects millions of computers across the world.

② Decentralized network - No single authority controls the entire Internet.

③ Uses packet switching - Data is divided into packets and transmitted efficiently.

④ Supports multiple services - Email, file sharing, video conferencing, online gaming, banking etc.

* World wide web (WWW)

- The world wide web, or web is a service that runs on the Internet.

- It is a collection of linked documents and resources accessible through web browsers.

* Features - Based on HTTP/HTTPS protocols -

- Displays information using web pages stored on web servers.

- Uses HTML for page structure.

- Resources are connected using hyperlinks.

- Accessed through browsers like Chrome, Firefox, Safari.

* Advent of the internet.

→ The development of the internet happened in several stages -

① ARPANET (1969) - Beginning of the internet

- Started by ARPA (Advanced Research Projects Agency) of the U.S. Department of Defense.
- First message sent between UCLA and Stanford in 1969.
- Designed for reliable communication even during network failures.

② Packet switching concept -

- Pioneered by Paul Baran and Donald Davies, enabling data to be sent in small packets instead of one large block.

③ Development of TCP/IP (1970s)

- Transmission Control Protocol / Internet Protocol (TCP/IP) was developed by Vint Cerf and Bob Kahn.

④ Expansion to universities & Research (1980)

- NSFNET established by the National Science Foundation, connecting universities and research centers.
- Replaced ARPANET and rapidly expanded the network.

⑤ World wide web (1989-1991)

- Created by Tim Berners-Lee at CERN.
- Introduced HTML, URLs, HTTP, and the concept of websites.
- First website launched in 1991.

⑤ Commercialization of the internet (1990s)

- Internet become available for public and commercial use.

- Birth of email services, search engines, e-commerce social media.

⑥ Broadband, wi-fi & mobile internet (2000s onwards)

- High-Speed internet, wireless networks, 3G/4G/5G revolutionized connectivity.

Q7

→ Internet infrastructure for data transfer

- The internet is a global network of interconnected computers and communication systems. its infrastructure has several layers that allow data to move efficiently between devices worldwide.

① Physical layer

- This is the foundation that carries internet data.

② Network layer

- This layer uses the internet protocol (IP)

③ Transport layer

- Main protocols

① TCP ② UDP

④ Application layer

- This layer supports user-level communication & services

- HTTP/HTTPS

- SMTP/IMAP

- FTP

- DNS

* Internet Governance -

- Internet Governance refers to the rules, policies, standards and decision-making processes that shape how the internet is used and operates.
- No single entity controls the internet; instead, governance is multi-stakeholder.

* components of internet governance -

(a) Technical standardization Bodies.

(1) IETF (Internet Engineering Task Force)

(2) W3C (World Wide Web Consortium)

(b) Global coordination organization -

- ICANN

- Manages domain names

(c) Governments -

- Regulate telecommunications and internet service

(d) Private sector -

- Telecom companies, ISPs, tech companies provide infrastructure & services.

(e) Civil society -

- Advocates for open access, digital rights, privacy, and inclusion.

* Role of the internet society -

- The Internet Society (ISOC) is a global non-profit organization founded in 1992 to ensure the open development, evolution & use of the internet.

Major roles of Isoc -

(a) Promoting an open and Accessible internet -

- Isoc Supports Policies that keep the internet free, open and universally accessible.

(b) Supporting the IETF -

- Isoc provides financial and organizational support to the IETF, which develops internet standards.

(c) Developing internet infrastructure

- Helps build community ~~new~~ networks.

(d) Internet Governance Participation

Isoc Participates in policy discussion on

- net neutrality

- privacy and security

(e) Cybersecurity and trust Programs -

- Internet security standard.

(f) Awareness, Education and Research

- safe internet use.

- Best technical practices.

- Q.1. Define Cyberspace & explain architecture of cyberspace in detail.
- Q.2. Explain the internet World Wide Web (WWW). Also describe the advent of the internet.
- Q.3. What is Cyber Security? Explain the major issues & challenge of cyber security.
- Q.4. Describe the internet infrastructure for data transfer & governance. Also explain the role of Internet Society.

Q.3. Cyber security -

- Cyber security is used to secure system, software, data and website from unauthorized access. Cyber security is the practice of protecting computers, networks, mobile devices, data, and systems from unauthorized access, attacks, damage or theft.

- Cyber security protects individuals companies and governments from digital threats such as hackers, malware, phishing and cybercrimes.

• Major issues and challenges in cyber security.

1. Increasing cyber Attacks -

Cyber crimes like hacking, data breaches, phishing, DDoS attacks, etc. are growing every year. Attackers use advanced tools, making it difficult to defend systems.

2. Shortage of Cyber Security Professionals -

There are not enough skilled cyber security experts globally. This makes organizations vulnerable because they lack people to monitor & defend their systems.

3. Rapidly Evolving Technology-

- New technologies like IoT, AI, cloud computing, and 5G create more entry points for attacks. Security teams struggle to keep up with fast-changing threats.

4. Weak passwords & Human Errors.-

- Human mistakes (like clicking fake links, sharing passwords, or misconfiguring systems) cause many cyber breaches.

5. Malware and Ransomware Threats -

- Hackers use malicious software to steal or lock data. Ransomware attacks are increasing and cause huge financial losses.

6. Cloud Security Issues -

- Organizations are moving to cloud services. Misconfigurations, unauthorized access, and insecure APIs make cloud environments.

7. Lack of Awareness -

- Many users still don't know how to stay safe online. Lack of basic knowledge leads to successful phishing, scams, and identity theft.

A. 1. Cyberspace -

- Cyberspace refers to the virtual, digital environment created by interconnected computers, networks, devices, and the internet where communication, data exchange, and online activities take place.

- Cyberspace is the global digital environment where people, computers & systems interact through

the internet.

• Architecture of Cyberspace -

- Cyberspace architecture describes how various components work together to enable communication, computing and data exchange. It is usually explained using five layers.

1. Physical layer

This is the foundation of cyberspace.

• Includes:-

- Cables (fiber optic, coaxial)
- Routers, switches
- servers, data centers

• Function :-

- Provides the hardware and physical connections that enable data transmission.
- Converts digital data into electrical/optical signals and transmits it.
- Converts digital data

2. Network Layer -

This layer is responsible for routing & forwarding data.

• Includes -

- IP addresses
- Routers and gateways
- Network protocols (TCP/IP, DNS, DHCP)

• Function -

- Establishes paths for communication between devices.
- Manages addressing, routing and naming services.

3. Transport Layer -

This layer ensures reliable communication between systems.

• Includes -

- TCP (Transmission Control Protocol)

- UDP (User Datagram Protocol)

- SSL/TLS (for secure communication)

• Function :-

- Provides error control and flow control.

- Ensures data is delivered without loss or duplication.

- Maintains end-to-end communication between applications.

4. Application Layer -

This layer supports software applications that users interact with.

• Includes :-

- Web browsers

- Email services

- Cloud applications

• Function :-

- Provides services for users and applications to communicate over the network.

- Converts data into a usable format (text, videos, images).

5. User Layer (Human Layer)

This layer involves people who interact with the digital world.

• Includes -

- Users

- Cyber criminals

• Function -

- Humans create, share and manage information.
- This layer is vulnerable to social engineering attacks (phishing, scams).

Q.2. World Wide Web (WWW) -

The world wide web (WWW) is a system of interlinked web pages, websites and multimedia content that can be accessed through the internet using the web browser.

• Key features of WWW :-

- Uses HTTP/HTTPS protocols to access web resources.
- Information is stored in documents called web pages, written using HTML.
- These pages are linked using hyperlinks.
- It is service that runs on top of internet.

• Working of WWW -

- User enters a URL in browser
- Browser sends a request to web server using HTTP.
- Server finds the required page.
- Browser displays the page to the user.

• Advent of the internet -

- The advent of the internet refers to how the internet began & developed into global network we use today.

1. 1960s - Origin: ARPANET

- The internet started as ARPANET in 1969, created by U.S. Department of Defense (ARPA).

- Initially connected only four universities.
- Goal: allow communication even if part of the network was damaged.

2. 1970s - Development of protocols

- TCP/IP protocol was developed by Vint Cerf and Bob Kahn.

- Domain Name System (DNS) introduced in 1984.

3. 1990s - Birth of the Modern Internet

- Tim Berners-Lee introduced the World Wide Web (WWW) in 1991.

- First web browser Mosaic was released in 1993.

- Internet made public and commercialized.

- Websites, email, online services grew rapidly.

4. 1980s - Expansion

- More universities and research institutions joined.

- It became the standards for data communication.

5. 2000s - Broadband & Social Media Era

- High-speed internet became common.

- Rise of platforms like Google, Facebook, YouTube.

6. 2010s to present - Mobile & cloud internet.

- Smartphones made internet accessible everywhere.

- Cloud computing, IoT, AI, 5G expanded internet usage.

Q.4. Internet infrastructure for data Transfer:-

- Internet infrastructure refers to the physical and logical components that allow data to travel across the world. It includes hardware, software, protocols, and service providers that make communication possible.

- This infrastructure can be understood in four parts-

1. Physical Infrastructure (Hardware Layer)

- This is the foundation of the internet.

• Includes -

- Fiber-optic cables (undersea and underground).
- Routers, switches, Modems.
- Data centers and servers.
- Cell towers, satellites and Wi-fi access points.

• Function -

- Transfer raw data signals through wired or wireless mediums.

2. Network Infrastructure (IP & Routing Layer)

- This layer ensures data finds the correct path.

• Key Elements -

- IP addresses (Identifier of a device)
- Routers (forward data packets)
- Routing protocol such as BGP (Border Gateway Protocol).

• Function -

- Divides data into packets.
- Finds the best route from sender to receiver.
- Makes global communication possible.

3. Transport Layer

- Ensures reliable and smooth data delivery.

- Protocols -
 - TCP (Transmission Control Protocol) - reliable, error-checked communication.
 - UDP - Faster but no error checking.

• Function -

- Ensures correct sequencing of packets.
- Performs error detection and correction.
- Manages congestion control.

4. Application Layer

- The top layer responsible for user services.

• Includes -

- HTTP / HTTPS (web)
- SMTP / IMAP (email)
- FTP (file transfer)

• Function -

Enables communication for websites, apps, emails, cloud services, etc.

* Internet Governance

Internet governance refers to the rules, policies, coordination and standards that ensure the internet works smoothly across the world.

1. IETF (Internet Engineering Task Force)

Develops technical standards and protocols

- TCP / IP

- HTTP

- IPv6