



UNIVERSITY OF JAMMU

(NAAC ACCREDITED A + GRADE UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

NOTIFICATION

(24/Aug./Adp/57)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Competent Bodies, has been pleased to authorize the adoption of the revised Syllabi and Courses of Studies in **Bachelor of Technology (B. Tech) in Computer Science & Engineering** for Semester V to VIII under the **Credit Based System** as per the new **AICTE Model Curriculum** adopted from batch 2022 and onwards (as given in the Annexure) for the candidates of **Govt. /Pvt. Engineering Colleges affiliated with the University of Jammu** for the Examinations to be held in the years indicated against each Semester as under:-

Branch	Semester	for the Examination to be held in the years
Computer Science & Engg.	Semester-V	Dec. 2024, 2025, 2026, and 2027
	Semester-VI	May 2025, 2026, 2027 and 2028
	Semester-VII	Dec. 2025, 2026, 2027 and 2028
	Semester-VIII	May 2026, 2027, 2028 and 2029

The Syllabi of the course is available on the University Website: www.jammuuniversity.in.

-Sd/

DEAN ACADEMIC AFFAIRS

No. F.Acd/III/24/0619-28

Dated: 08/08/2024

Copy for information & necessary action to:-

1. Dean Faculty of Engineering
2. Principal, GCET/MBSCET /UIET/BCET/YCET
3. C.A to the Controller of Examinations
4. Joint /Assistant Registrar (Exams Prof. /Eval Prof. /Confidential)
5. Incharge University Website for uploading the same in the University Website.

Sumilashama
Deputy Registrar (Academic) 8/8/2024

Subinaya 7/8/24
Rak 7/8/2024

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the Year
December 2024, 2025, 2026, 2027**

B. Tech. 5th Semester

Contact Hrs:24

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL	Credits	% Change
			L	T	P	Internal	External			
CST-3501	Professional Core Course	Analysis & Design of Algorithms	2	1	0	25	75	100	3	100%
CST-3502	Professional Core Course	Computer Networks	2	1	0	25	75	100	3	100%
CST-3503	Professional Core Course	Microprocessor & Interfacing	2	1	0	25	75	100	3	100%
CST-3504	Professional Core Course	Theory of Computation	2	1	0	25	75	100	3	100%
ECO-1505	Open Elective Course	Introduction to The Internet of Things	2	1	0	25	75	100	3	100%
EEO-2505		Non-Conventional Energy Resources & Instrumentation								
ITO-4505		Linux Programming								
MEO-5505		3D Printing								
CEO-6505		Essentials of Civil Engineering								
MOC-3501	Massive Open Online Course	SWAYAM / NPTEL	3	0	0	-	100	100	3	100%
CSP-3512	Professional Core Lab Course	Computer Networks Lab	0	0	2	25	-	25	1	100%
CSP-3513	Professional Core Lab Course	Microprocessor Lab	0	0	2	25	-	25	1	100%
FECO-1515	Open Elective Lab Course	Introduction to The Internet of Things Lab	0	0	2	25	-	25	1	100%
EEO-2515		Non-Conventional Energy Resources & Instrumentation Lab								
ITO-4515		Linux Programming Lab								
MEO-5515		3D Printing Lab								
CEO-6515		Essentials of Civil Engineering Lab								
SIT-3511	Summer Internship Training	Summer Training I	-	-	-	25	-	25	1	100%
TOTAL			13	05	6	225	475	700	22	

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: Computer Engineering /CSE

SEMESTER:5th

COURSE TITLE: ANALYSIS & DESIGN OF ALGORITHMS

COURSE NO: CST-3501

DURATION OF EXAM: 3 HOURS

CREDITS-3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the course the student will be able to: -

CO1	Gain knowledge about the Design techniques, Data Structures and mathematical tools to analyze algorithms for effective problem solving in computing.
CO2	Apply various algorithmic design paradigms for real time problems.
CO3	Analyze asymptotic performance and complexity involved in various algorithms
CO4	Understanding the limits of efficient computation through the concepts of P, NP and NP-Complete problems and get familiar with main thrust of work in algorithm sufficient to give some context for formulating and seeking known solutions to an algorithmic problem.

Section- A

Introduction to Algorithms: Analysing the Performance of an Algorithm, Space/Time complexity, Asymptotic Analysis, Recurrence Relations **(05 hours)**

Heap & Hash Tables: - Representing a Heap, Building a Heap, Operations on Heaps, Applications-Priority queues using heaps, HeapSort, Hash Table, Hashing Functions, Resolving Collision by separate Chaining, Open Addressing, Quadratic Probing, Double Hashing, Rehashing. **(06 hours)**

Lower Bound Theory: - Comparison Trees for searching & Sorting, Parallel Comparison trees, Oracle & Adversary Arguments, Lower Bounds through Reduction. **(04 hours)**

NP-Completeness: Introduction, Non-Deterministic Algorithms, Polynomial Time Algorithms, P, NP, NP-complete and NP Hard classes, Reducibility and NP-completeness, Satisfiability, Cook's Theorem, Introduction to Approximation Algorithm. **(05 hours)**

Section- B

Divide and Conquer: - Introduction, Binary Search, Finding the Maximum & Minimum, Merge sort, Quick Sort & Selection sort, Strassen's Matrix, Multiplication **(04 hours)**

Greedy Method: - Introduction, Activity Selection Problem, Knapsack Problem, Task Scheduling Problem, Optimal Merge Patterns, Single Source shortest path. **(05 hours)**

Dynamic Programming: - Introduction, Memoization, Multistage Graphs, 0/1 Knapsack Problem, Longest Common Subsequence **(05 hours)**

Back Tracking: - Introduction, N-Queens Problem, Hamiltonian Cycles, Graph Coloring Problem. **(04 hours)**

Branch & Bound: - Introduction, Bounding functions, FIFO Branch and Bound algorithm, Least Cost Search, Knapsack Problem, Traveling Salesperson Problem. **(03 hours)**

BOOKS RECOMMENDED:

- | | |
|--|--|
| 1. Fundamentals of Computer Algorithms. | Ellis Horowitz, Sartaj Sahni. |
| 2. Data Structure & Algorithm | J.M. Hopcraft, Ullman |
| 3. Introduction to Algorithms, Third edition MIT Press | Thomas H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein |
| 4. 2009 | |
| 5. Algorithm Design, Pearson education, 2014 | Jon Kleinberg, Eva Tardos |
| Algorithms Design and Analysis, Dhanpat Rai & Co. | Udit Agarwal |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: Computer Engineering/ CSE / IT
SEMESTER:5th
COURSE TITLE: COMPUTER NETWORKS
COURSE NO: CST-3502
DURATION OF EXAM: 3 HOURS

CREDITS-3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the course the student will be able to	
CO1	Gain a thorough understanding of fundamental concepts in computer networking, including network architecture, models (OSI & TCP/IP), protocols, networked systems, and applications
CO2	Analyze the components required for building different types of networks and to acquire knowledge of various networking protocols, methods, and standards.
CO3	Gain an understanding of channel allocation protocols, framing techniques, error control methods and flow control techniques.
CO4	Understand the concepts and applications of network addressing, subnetting and routing algorithms & be able to propose the solution for developing and optimizing networks.

Section- A

Introduction: Data Communication-communication system, synchronous and asynchronous systems, serial and parallel systems, dataflow-simplex, half-duplex, full-duplex, computer network-uses of computer network, categories of computer networks, protocol and standards, Reference Model-OSI and TCP/IP reference model, their comparison and critique, Network Topologies **(05 hours)**

Physical Layer: Data Transmission-Digital to Digital Conversion-Line Coding Scheme, Transmission Media, RS-232 Interface, Switching mechanisms and Comparison –circuit, packet, message **(06 hours)**

Data Link Layer: Design Issues, Error Detection and Correction, Flow Control-Elementary of data-link protocol, Sliding Window Protocol, Example of Data Link Protocol (HDLC). **(06 hours)**

Medium Access Control Sub layer: Channel Allocation Problems, Multiple Access Protocol-ALOHA, Carrier Sense Multiple Access Protocols, Collision Free Protocols, IEEE standards-802.3, 802.4, 802.5. **(06 hours)**

Section- B

Network Layer - Design Issues, Routing Algorithms- The optimality principle, shortest path algorithm, flooding, distance vector routing, link state routing and hierarchical routing, Congestion Control- principles prevention policies, congestion control in virtual circuit subnet and datagram subnets, Traffic shaping algorithm - leaky bucket algorithm, token bucket algorithm, QOS, IP protocol, IP addresses, Internet Multicasting, Introduction to IPV6 ,IPV4 vs. IPV6, Internetworking devices –Repeaters, Hub, Bridges, Switches, Routers, Gateways. **(10 hours)**

Transport Layer: Transport Layer Services, Primitives, Issues, and elements of transport protocol, Introduction to TCP and UDP **(04 hours)**

Session and Presentation Layer- Design issues, services and primitives **(04 hours)**

Application Layer: HTTP, FTP, DNS, E-Mail, Firewalls. **(04 hours)**

BOOKS RECOMMENDED:

- | | |
|--|------------------------------------|
| 1. Computer Networks | Andrew S. Tanenbaum, Prentice Hall |
| 2. Data Communication and Networking | Forouzan A. B, McGraw Hill |
| 3. Computer Networking Top Down Approach | Kurose L. and Rose, Pearson |
| 4. Computer Networking with Internet Protocol and Technology | Stallings W., Pearson |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS: 3

BRANCH: Computer Engineering/CSE/ IT

SEMESTER:5th

COURSE TITLE: MICROPROCESSOR & INTERFACING

COURSE NO: CST-3503

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the course the student will be able to	
CO1	Understand the knowledge of general architecture, organization and instruction sets of 8085 and 8086 microprocessors.
CO2	Understand, write structured and well-commented programs in assembly language with an ability to test and debug them in the laboratory.
CO3	Analyze architecture and operation of Programmable Interface Devices and realize the assembly language programming.
CO4	Understanding of digital interfacing and system connections.

Section- A

Architecture of 8085: Block diagram, Pin Description of 8085, Instruction Set and Instruction Format, Addressing Modes, Looping, Counting and Indexing, 8085 Interrupts. Interrupt handling in 8085, Enabling, disabling and masking of interrupts. **(10 hours)**

Counters and Time Delay Programs, Stack and Subroutines, Conditional Call and Return Instructions & Code Conversions, Timing diagram for different machine cycles. **(4 hours)**

Parallel Input/Output & Interfacing: - Basic Interfacing Concepts, Interfacing memory and I/O devices, Addressing memory, Interfacing a keyboard, Interfacing LED and seven segment displays. **(6 hours)**

Section- B

Programmable Interface Devices: - Basics of Programmable I/O, General Purpose Programmable Peripheral Devices – 8255A, 8259A, Direct Memory Access Controller – 8237. **(8 hours)**

Architecture of 8086: Memory Address space and data organization, segment registers and memory segmentation, Generating memory addresses, IO address space, addressing modes, Minimum mode and Maximum mode, system timing, Instruction Set and Programming Structure of 8086. **(12 hours)**

BOOKS RECOMMENDED:

1. Microprocessor Architecture, Programming and Applications with 8085 - Ramesh S. Gaonkar.
2. Microprocessor and Interfacing - Douglas V. Hall
3. Introduction to Microprocessors - Aditya Mathur

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 6th
COURSE NO: CST-3504
COURSE TITLE: THEORY OF COMPUTATION
DURATION OF EXAM: 3 HOURS

CREDITS:3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the basic concepts of formal languages, finite automata techniques and various problems to minimize FA.
CO2	Apply various languages to construct context free grammar.
CO3	Evaluate problems relating to Push down automata and Turing Machines

Section- A

Introduction: -Symbols, string Concatenation, alphabet, Language, Tree, Mathematical Induction Proofs, States, Transition Tables, Finite Automata, Regular Expressions, Push- down Automata, Turing Machine, Context Free grammars. **(8 hours)**

Finite Automata: - Deterministic Finite Automata (DFA), Designing, Non- deterministic finite Automata (NFA) without E-moves, Conversions, Equivalence, NFA with E-moves, Regular expression designing, Finite machine with output assigned, Moore and mealy machines, Conversion and Equivalence. **(12 hours)**

Section- B

Regular Grammar & Context free Languages: -Context Free Grammar, Context free Languages, reduced form of Grammar, Ambiguous and Non- Ambiguous grammar, acceptors and generators, Relations between Classes of Languages, Pumping lemma of regular sets, Chomsky's hierarchy of languages, derivation Trees. **(10 hours)**

Turing Machines: -Turing Hypothesis, Turing Computability, Non- deterministic, Multitude and other versions of Turing machines, Churches Hypothesis, Primitive Recursive functions, Universal Turing machines, decidability, Halting problem, Stack Automata. **(10 hours)**

BOOKS RECOMMENDED:

1. Introduction to Automata Languages & Computation A.V. AHO, J. E. Hopcroft & J.D. Ullman
2. Introduction Theory of Computer Science E. V. Krishna Moorthy

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS: 3

BRANCH: Electrical /Computers/ IT/Mechanical/ Civil
SEMESTER:5th
COURSE TITLE: Introduction to The Internet of Things
COURSE NO: ECO-1505
DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Demonstrate basic concepts, principles, and challenges in IoT.
CO2	Illustrate the functioning of hardware devices and sensors used for IoT.
CO3	Analyze network communication aspects and protocols used in IoT.
CO4	Apply IoT for developing real-life applications using Arduino programming.

Section-A

Unit-I Introduction to IOT

Vision, Definition, Conceptual framework, Architecture view, Sources of IoT, Understanding IoT fundamentals, IOT Architecture and communication protocols, Various Platforms for IoT and cloud computing benefits, Real-time examples of IoT, Overview of IoT components and IoT Communication Technologies, Challenges in IoT.

(10 Hours)

Unit-II Arduino Simulation Environment

Arduino Uno Architecture and platform Board Anatomy, Setup the IDE, coding using an emulator. Overview of IOT-supported Hardware platforms such as Raspberry pi, and ARM cortex.

(06 Hours)

Unit-III Sensor & Actuators with Arduino

Overview of Sensors working, Analog and Digital Sensors, Actuators, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensor with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino. Interfacing LED, push button, buzzer with Arduino along with LCD and DC motor.

(08 Hours)

Section B

Unit-IV Basic Networking with ESP8266 Wi-Fi module

Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module, Various Wi-Fi libraries, Web server-introduction, installation, configuration, posting sensor(s) data to the web server platforms, Thing Speak API and MQTT, Interfacing ESP8266 with Web services.

(11 Hours)

Unit V -Challenges in IoT Design challenges:

Development Challenges, Security Challenges, Other challenges IoT Applications: Smart Metering, E-health, City Automation, Automotive Applications, home automation, smart cards, communicating data with H/W units, mobiles, tablets, Designing of smart street lights in a smart city.

(10 Hours)

RECOMMENDED BOOKS:

1. Olivier Hersent, David Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", Willey
2. Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", Willey
3. Jeeva Jose, Internet of Things, Khanna Publishing House
4. Michael Miller "The Internet of Things" by Pearson
5. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition, 2016
6. Arshdeep Bahga, Vijay Madiseti "Internet of Things (A hands-on approach)" 1ST edition, VPI publications,2014

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

**BRANCH: ECE / Computers/ IT/ Mechanical/ Civil
SEMESTER: 5th**

CREDITS: 3

**TITLE: NON-CONVENTIONAL ENERGY
RESOURCES AND INSTRUMENTATION**

COURSE CODE: EEO-2505

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the need of energy, Various types of energy and scenario.
CO2	Identify non-conventional energy as alternate form of energy and to know how it can be tapped.
CO3	Understanding various methods of measurement and instrumentation.
CO4	Understanding different types of wattmeter and their errors.

Section-A

Module 1: Introduction: Limitations of conventional energy sources need & growth of alternate energysources, basic schemes and applications of direct energy conversion. Photovoltaic effect, characteristics of photovoltaic cells, conversion efficiency, solar batteries and applications. Solar energy in India, solar collectors, solar furnaces & applications. Geothermal system, Characteristics of geothermal resources, choice of generators, electric equipment and precautions. Low head hydro plants, definition of low head hydro power, choice of site and turbines.
(12 hours)

Module 2: Wind Energy & MHD Generators: History of wind power, wind generators, theory of wind power, characteristics of suitable wind power sites, scope in India. Basic Principles and Halfeffect, generator and motor effect, different types of MHD generators, conversion effectiveness. Practical MHD generators, applications and economic aspects.
(10 hours)

Section-B

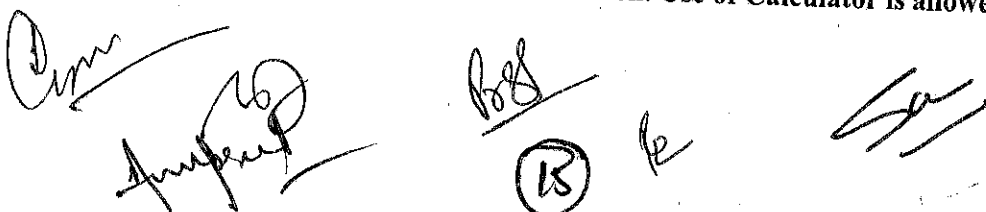
Module 3: MEASURING INSTRUMENTS: Classification, effects utilized in measuring instruments. Indicating instruments: Deflection, controlling and damping forces, various dampings. Measurement of low resistance: - Potentiometer method, Kelvin double bridge. Ammeters and Voltmeters: Moving coil, moving iron ammeter and voltmeters, Errors in Ammeters and Voltmeters.
(11 hours)

Module 4: MEASUREMENT OF POWER: Wattmeter measurement in single phase A.C. circuits, Wattmeter errors. Measurement of three phase power by two wattmeter methods. Energy meters for A.C. circuits, Theory of Induction type meters.
(10 hours)

RECOMMENDED BOOKS:

- | | |
|---|---------------------------|
| 1. Non-conventional Energy Resources | D.S. Chauhan |
| 2. Conventional energy sources | G.D. Rai |
| 3. Non-Conventional energy sources | B.H. Khan |
| 4. Solar Energy Fundamentals and Applications | H.P. Garg and Jai Prakash |
| 5. A course in Electrical and Electronics Measurement & instrumentation | A.K. Sawhney |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: ECE/ Electrical/Computers/ Mechanical/ Civil
SEMESTER:5th
TITLE: LINUX PROGRAMMING
COURSE CODE: ITO-4505
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Explain multi user OS LINUX and its basic features
CO2	Interpret LINUX Commands, Shell basics, and shell environments
CO3	Design and develop shell programming, communication, System calls and terminology.
CO4	Design and develop LINUX File I/O and LINUX Processes.

Section- A

Overview of Linux: What is Linux, Linux, s root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Overview of Unix and Linux architectures, hardware requirements for Linux, hardware requirements for Linux, Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons. **(06 hours)**

Essential Linux commands: Processes in Linux Process fundamentals, Connecting processes with pipes, | Redirecting input, Redirecting output Background processing, Managing multiple processes, Process scheduling – (at,batch), nohup command, kill, ps, who, find, sort, touch, file, File processing commands – wc, cut, paste etc, Mathematical commands – expr, factor etc, Creating files with vi editor. Editing files with vi editor. **(06 hours)**

Shell programming: Basics of shell programming ,various types of shell available in Linux, Comparisons between various shells ,Shell programming in bash ,Conditional statements, Looping statements, Case statement ,Parameter passing and arguments, Shell variables ,System shell variables shell keywords ,Creating Shell programs for automating system tasks. **(08 hours)**

Section- B

System administration: Common administrative tasks ,identifying administrative files, Configuration and log files, Role of system administrator ,Managing user accounts -adding users ,Managing user accounts -deleting users, Changing permissions and ownerships ,Creating and managing groups ,Temporary disabling of users accounts, Creating and mounting file system, Checking and monitoring system performance ,file security and Permissions ,becoming super user using su ,Getting system information with uname, host name, Disk partitions and sizes ,rpm command. **(12 hours)**

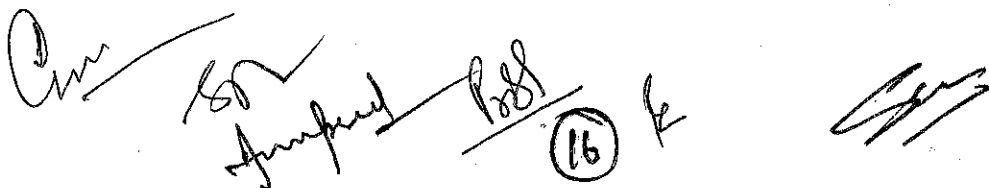
Simple filter commands & Understanding various Servers. Filter Commands-pr, head, tail ,Filter Commands -cut, sort. Filter Commands- uniq, tr, Filter using regular expression grep, DHCPDNS, ApacheSquid, Apache, Telnet, FTP, Samba. **(8 hours)**

BOOKS RECOMMENDED:

1. UNIX Shell Programming, First edition, BPB.
2. Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.
3. Linux System Programming

Yeswant Kanethkar
 Cristopher Negus
 Robert Love, O'Reilly, SPD.

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS: 3

BRANCH: ECE /Electrical/ Computers/ IT/Civil
SEMESTER: 5th
COURSE TITLE: 3D PRINTING
COURSE CODE: MEO-5505
DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
On completion of the course the students will be able to	
CO1	Identify key 3D printing technologies, and corresponding major industry segments
CO2	Identify key material properties for 3D printability for each printing technique
CO3	Compare and differentiate printing methods and printable materials based on specific application
CO4	Manufacture devices and tools using 3D printing
CO5	Assess the 3D printing industry and the global effects of 3D printing particularly on engineering and manufacturing

Section-A

3D Printing Materials: Types of Materials, Properties of materials, Application of materials in mechanical, chemical, electronics and software industry, Selection of Materials, Smart materials, Materials for 3D Printing, Bio materials, composite materials etc.

Introduction to Design, Prototyping fundamentals. Introduction to 3D printing, its historical development, commonly used terms in 3D modelling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, RP data formats, Classification of 3D printing process, Applications to various fields.

Pre-Processing in 3D Printing (3D Modeling and Design)

Creation of 2D geometry using Auto CAD, 2D drawing space, AutoCAD Modify commands, Construct orthographic sectional views of brackets with dimension in different layers, 3D solid Modeling Create 3D solid and edit solid, Create a new assembly, insert components into an assembly, Design for 3D printing.

(20 Hours)

Section-B

Liquid Based 3D Printing: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages.

Solid ground curing (SGC): Models and specifications, process, working principle, applications, advantages and Disadvantages.

Solid Based 3D Printing

Laminated object manufacturing (LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages.

Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages.

(20 Hours)

RECOMMENDED BOOKS:

- | | |
|--|------------------------------------|
| 1. Additive Manufacturing Technology | Ian Gibson, Davin Rosen |
| 2. Additive Manufacturing Fundamentals and Advancement | Manu Srivastava, Sachin Maheshwari |
| 3. 3D printing and Additive Manufacturing | Chua Chee Kai, Leong Kah Fai |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS: 3

BRANCH: ECE / Computers/ IT/ Mechanical/Civil
SEMESTER: 5th
TITLE: ESSENTIALS OF CIVIL ENGINEERING
COURSE CODE: CEO-6505
DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

On completion of the course the students will be able to

CO1	Able To Identify The Properties Of Building Materials.
CO2	Acquaint With The Masonry Construction And Finishes
CO3	Carry Out Surveying In The Field For Engineering Projects.
CO4	Plan And Schedule The Project By Various Network Techniques Of Construction Planning

Section-A

Brick: Classification of Bricks, Constituents of Good Brick Earth, Harmful Ingredients, Manufacturing Of Bricks, Testing Of Bricks.

Timber: Classification Of Timber, Structure Of Timber, Seasoning Of Timber, Defects In Timber And Prevention Of Timber.

Aggregates: Classification Of Aggregates And Various Tests Conducted On Aggregates.

Cement: Composition Of Cement, Types Of Cement, Manufacturing Of Cement, Tests On Cement.

Concrete : Grades Of Concrete, Strength Of Concrete, RMC (Manufacturing Of RMC, Transportation), Tests On Concrete.
(20 hours)

Section-B

Masonry Construction Introduction: Various Terms Used, Stone Masonry-Dressing Of Stones, Classifications Of Stone Masonry, Safe Permissible Loads, Brick Masonry-Bonds In Brick Work, Laying Brick Work, Defects In Brick Masonry, Composite Stone And Brick Masonry.

Foundations: Purpose, Site Exploration, Methods of Testing Bearing Capacity Of Soils, Types Of Foundations.

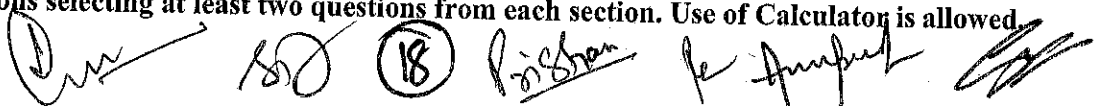
Introduction to Surveying, Principles of Surveying, Measurement Of Distance. Chain Surveying, Field Equipment, Methods of Chain Surveying, Plotting From The Field Books And Degree Of Accuracy, Tape Corrections.

Levelling: Instruments Used and Field Book Recording, Height Of Instrument Method, Rise And Fall Method, Temporary And Permanent Adjustments In Levels.
(20 hours)

BOOKS RECOMMENDED:

1	Building material & construction	Sushil kumar
2	Building material	Prabin singh
3	Surveying vol.- i	B.C Punmia.
4	Concrete technology	M.L Gambhir

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: Computer Engineering/CSE
SEMESTER: 5th
COURSE TITLE: SWAYAM / NPTEL
COURSE NO: MOC-3501

CREDITS: 3

L	T	P	Marks	
			External	Internal
3	0	0	100	-

The department shall offer the 12 weeks NPTEL course, out of the list of courses listed by NPTEL around the time of commencement of the semester.

The courses offered shall be related to the core stream but should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the NPTEL course will be under the supervision of the faculty Incharge of the department.

The NPTEL certification course comprises of Assignments (25%) and Proctored Examination (Online examination MCQ's based = 75%) conducted at the end of the semester by IIT Madras as per notified schedule.

The marks obtained by the student in the NPTEL certification course will be tabulated by the concerned department.

Note :-

- (i) *The Course is declared pass in the semester only after the production of the NPTEL Certificate, by the student. In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be awarded by NPTEL and hence the student will be deemed to have failed in the said Course. The student has to appear again in the NPTEL examination conducted either in the same course or any other course as per the next semester schedule of NPTEL and earn the certificate by passing the exam.*
- (ii) *The students must select their College name while registering for a particular course. Thereafter, the option of sharing the result with the institute also needs to be selected. Only those certificates will be accepted and validated by department whose information is shared by NPTEL to college authorities.*

No certificate will be accepted without this and student will be marked absent in the college records.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS:1

BRANCH: Computer Engineering/CSE /IT
SEMESTER:5th
COURSE NO.: CSP-3512
COURSE TITLE: COMPUTERS NETWORKS LAB

L	T	P	Marks
-	-	2	25

<u>LABORATORY OUTCOMES</u>	
After Completion of this course the student will be able to: -	
CO1	Understand fundamental underlining principles of computer networking and functionality of layered network architecture.
CO2	Analyze performance of various communication protocols.
CO3	Practice packet/ file transfer between nodes.

Lab Experiments:

Experiment 1	To study different types of networking cables.
Experiment 2	To implement the cross-wired cable and straight through cable using crimping tool.
Experiment 3	To study about different networking devices.
Experiment 4	WAP on bit stuffing and character stuffing using any language.
Experiment 5	To connect two computers in a local area network and to share file between them.
Experiment 6	To study about IP addressing, different notations for IP address, Classful/ Classless Addressing
Experiment 7	To implement various topologies using the LAN trainer kit.
Experiment 8	To demonstrate the simple network configuration with a router that connects three local area network (LAN)segments using Cisco Packet Tracer.
Experiment 9	To configure Static IP Routing using 3 Routers in Cisco Packet Tracer

NOTE: Additional Lab experiments/ practicals will be performed based on the course content requirement.

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B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the

Year December 2024, 2025, 2026, 2027

BRANCH: Computer Engineering / CSE / IT

SEMESTER :5th

COURSE NO.: CSP-3513

COURSE TITLE: MICROPROCESSOR & INTERFACING LAB

CREDITS:1

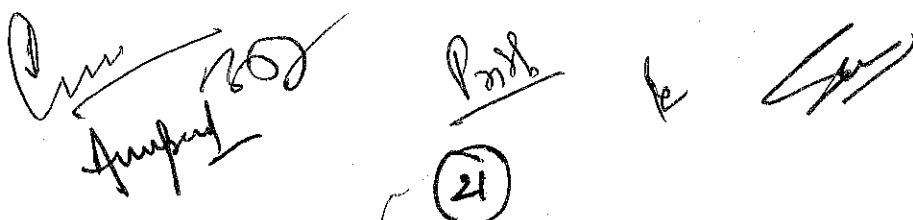
L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Classify and apply the instruction set of 8085 and 8086 microprocessors.
CO2	Design, code and debug Assembly Language programs to implement simple programs.
CO3	Apply programming knowledge using the capabilities of the stack, the program counter
CO4	Implement Time Delay Routine programming.

Lab Experiments:

Experiment 1	Block Transfer: - Data bytes are stored in memory locations from XX50H to XX5FH to insert an additional five bytes of data, it is necessary to shift the data string by five memory location. Write a program to store a data string from XX55H to XX64H. Use any 16 bytes of data to verify your program.
Experiment 2	Addition with Carry: Six bytes of data are stored in memory locations starting at XX50H. Add all the data bytes. Use register B to save any carry generated while adding the data bytes. Store the sum at two consecutive memory locations XX70H and XX71H.
Experiment 3	Checking for a particular data byte: A set of eight readings is stored in memory location starting at XX50H. Write a program to check whether a byte 40H exists in the set. If it does, stop checking, and display its memory location, otherwise output FFH.
Experiment 4	Write a program for BCD to Seven Segment LED code conversion.
Experiment 5	Write a program for Binary to ASCII code conversion.
Experiment 6	Write a program for BCD addition.
Experiment 7	Write a program for multiplication of Two 8 bit unsigned nos.
Experiment 8	Write a program to implement Stack operation.
Experiment 9	Write a program to implement procedures.
Experiment 10	Write a program to implement delay loops.

NOTE: Additional Lab experiments/practicals will be performed based on the course content requirements.



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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: Electrical / Computers/ IT/ Mechanical/Civil
SEMESTER: 5th
COURSE NO: ECO-1515
COURSE TITLE: Introduction to The Internet of Things Lab

CREDITS:1

L	T	P	Marks
-	-	2	25

<u>LABORATORY OUTCOMES</u>	
At the end of the semester, the students will be able to	
CO1	To develop the knowledge and interfacing of components using embedded C
CO2	To know about XBEE and its communication devices
CO3	To have the knowledge about Arduino module and its interfacing with GSM and Bluetooth
CO4	To demonstrate the ESP8266 module and its interfacing with Arduino.

LIST OF PRACTICALS:

SECTION -A

Embedded Experiments

1. Learning the Embedded C programming concepts
2. Interfacing of peripherals like LEDs, seven segment and LCD.
3. Interfacing of Relay and Buzzer Module.
4. Interfacing of various Sensors with Arduino Board.
5. Interfacing of Temperature Humidity Sensors and turning on Relay at threshold level.

SECTION -B

Wireless Experiments

6. How to communicate two XBEE modules in AT mode
7. How to configure a XBEE module in Broadcast and API Mode
8. How to read the destination address of XBEE module using API mode
9. Data sharing using Bluetooth module to the Android APP
10. Making a call and receiving a call using GSM module

SECTION -C

IoT Experiments

11. Interfacing Wi-Fi with Arduino Module
12. Study of various AT Commands for Wi-Fi
13. Setting a Link with things Speak Server.
14. Updating Data of Sensors on Thing Speak cloud using Wi-Fi Module
15. Study of AT commands for the GSM Module.
16. Updating data on Cloud using GSM module.

NOTE: Each student has to perform at least ten experiments at least two from each section, out of which 40% shall be simulation-based. Additional Practicals / Experiments will be performed based on the course content requirements.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: ECE/CSE/IT/Mechanical /Civil

SEMESTER :5th

COURSE NO: EEO-2515

**COURSE TITLE: NON-CONVENTIONAL ENERGY RESOURCES
AND INSTRUMENTATION LAB**

CREDITS:1

L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES

At the end of the semester, the students will be able to

CO1	Measure phase and frequency using CRO and Multimeter
CO2	Students will be able to understand Solar Radiation, distillation
CO3	To study Solar Energy solar cooker, street light and its applications
CO4	To study Fuel Cells

LIST OF PRACTICALS:

1. To study the extension of Ammeter and voltmeter ranges.
2. To Study Block Wise Construction of Multi meters & Frequency Counter
3. To Study Block Wise Construction of Analog Oscilloscope & Function Generator.
4. To study the connection of solar panels.
5. To study overall efficiency of solar PV and battery integrated system
6. To Study of Solar Radiation by using Pyranometer.
7. To Study of Solar Distillation or Solar Still.
8. To study the constructional details of a box type solar cooker.
9. To Study of Solar Street Lighting and Lanterns.
10. To Study of Fuel cells.

NOTE: Additional Lab Experiments/Practical will be performed based on the course content requirements.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: E&C/Electrical/CSE/Mechanical /Civil
SEMESTER: 5th
COURSE NO: ITO-4515
COURSE TITLE: LINUX PROGRAMMING LAB

CREDITS:1

L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES

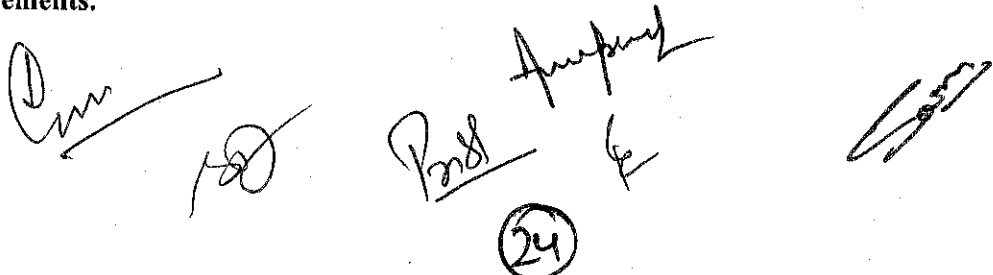
At the end of the semester, the students will be able to

CO1	Install LINUX and its working environment.
CO2	Understand Linux commands to manage files and file systems
CO3	Write a shell programs to solve a given problems
CO4	Write Regular expressions for pattern matching and apply them to various filters for a specific task
CO5	Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem

Lab Experiments:

Experiment 1	Implement the Linux Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit, Commands related to inode, I/O redirection, piping, process control commands, mails, manage the password, Vieditors, wild card characters used in Linux.
Experiment 2	Write a shell programs to perform operations using case statement such as 1)Addition 2)subtraction 3)multiplication 4)Division
Experiment 3	Write a shell scripts to see current date, time username and directory.
Experiment 4	Write a shell programs to find maximum of three numbers
Experiment 5	Write a script to check whether the given no. is even/odd
Experiment 6	Write a script to calculate the average of n numbers
Experiment 7	Write a script to check whether the given number is prime or not
Experiment 8	Write a script to calculate the factorial of a given number
Experiment 9	Write a script to calculate the sum of digits of the given number
Experiment 10	Write a shell script to print file names in directory showing date of creation & serial no. of file.

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.



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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: ECE/CSE/IT/Electrical/Civil
SEMESTER: 5th
COURSE NO: MEO-5515
COURSE TITLE: 3D PRINTING LAB

CREDITS:1

L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES

At the end of the semester, the students will be able to

CO613.1:	Develop CAD models for 3D printing and import and export AD data and generate.stl file.
CO613.2:	Selecta specific material and a 3D printing process for the given application.
CO613.3:	Produce a product sing 3D Printing.

LIST OF EXPERIMENTS:

1. To study the basic features of a 3D printing machine.
2. To study the different components of 3D printer.
3. To study the various type of 3D Printer
4. To print a 3D model of nut/bolt using PLA material.
5. To print a 3D model of spanner using PLA material.
6. To print a 3D model of pyramid using PLA material.
7. To print a 3D model of gear using PLA material.
8. To print a 3D model of bearing using PLA material.

NOTE:

1. At least six practicals should be performed.
2. Additional lab/experiment will be performed based on course content requirement.
3. Simulation/virtual labs are used to enhance the practical ability of student

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B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027

BRANCH: ECE/CSE/IT/Electrical/Civil

SEMESTER: 5th

COURSE NO: CEO-6515

COURSE TITLE: ESSENTIALS OF CIVIL ENGINEERING LAB

CREDITS:1

L	T	P	Marks
-	-	2	25

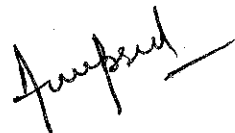
<u>LABORATORY OUTCOMES</u>	
At the end of the semester, the students will be able to	
CO1	Perform tests on bricks and aggregates
CO2	Determine the physical properties of cement.
CO3	Determine the Workability and Compressive strength of concrete
CO4	Determine the Specific gravity, Atterberg limits, Compaction characteristics of Soil

LIST OF EXPERIMENTS:

1. To determine water absorption and compressive strength of bricks
2. To determine the consistency and initial and final setting time of a given sample of cement using Vicat's apparatus.
3. To determine the Soundness and Compressive strength of cement.
4. To determine the fineness modulus and bulk density of fine and coarse aggregates.
5. To determine flakiness index and Impact value of coarse aggregates.
6. To determine Workability and Compressive strength of concrete
7. To determine the tensile strength of the steel.
8. To determine the Specific gravity and Atterberg limits of Soil.
9. To determine the compaction characteristics of soil by proctor's test.
10. To determine Cd for Venturi meter
11. To determine Cd for Orifice meter
12. To determine Cd for a Notch













**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

BRANCH: Computer Engineering/CSE
SEMESTER: 5th
COURSE NO.: SIT-3511
COURSE TITLE: SUMMER TRAINING- I

CREDITS: 1

L	T	P	Marks
-	-	-	25

<u>COURSE OUTCOMES</u>	
On completion of the course the students will be able to	
CO1	Interact and study with a range of students and to practice multiple management skills, including communication, independent action and teamwork.
CO2	Understand the engineering code of ethics and be able to apply them as necessary.
CO3	Demonstrate knowledge of practical application of training.

Students are required to undertake 4 weeks Practical Training during the summer vacations in the field of Computer Engineering and applications in Govt./Semi-Govt./Private sector. Thereafter, each student shall be required to submit a report on the practical training to the department for evaluation.

OR

The students can opt to undertake an online course / MOOC (related to the discipline) from a reputed platform of not less than 40 hours (with Certificate).

OR

The students have an option to take a 4 weeks SWAYAM/NPTEL Course and earn a certificate for the same.

Guidelines for evaluation of Practical Training: The evaluation shall be done by the departmental committee during 5th semester. The committee shall have a convener and at least two members.

Distribution of Marks as per University statutes:

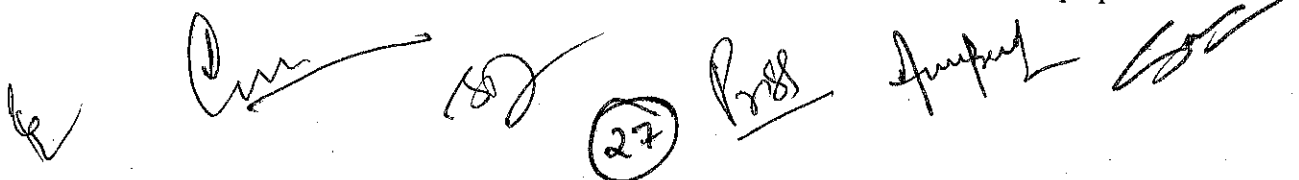
Total marks of evaluation	=25	
i) Report	=7.5	30%
ii) Viva-Voce & Presentation	=12.5	50%
iii) Level of IT	=5	20%

NOTE:

- In Case a student has earned a certificate from Swayam / Nptel Platform, the marks so obtained shall be awarded on a proportionate basis.
- Due weightage will be given to those who have opted for Industrial Training outside the State as well as keeping in view the profile of that Industry.

Award of the Marks:

Marks under (i), (ii) & (iii) will be awarded by the departmental committee constituted for the purpose



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the Year
May 2025, 2026, 2027, 2028**

B. Tech. 6th Semester

Contact Hrs:22

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL	Credits	%
			L	T	P	Internal	External			Change
HMT-7601	Humanities & Social Science Course	Fundamentals of Economics	2	1	0	25	75	100	3	100%
CST-3601	Professional Core Course	Cyber Security	2	1	0	25	75	100	3	100%
CST-3602	Professional Core Course	Compiler Design	2	1	0	25	75	100	3	100%
CST-3603	Professional Core Course	Operating Systems	2	1	0	25	75	100	3	100%
CST-3604	Professional Core Course	Data Science	2	1	0	25	75	100	3	100%
CST-3605	Professional Elective Course	Computer Graphics	2	1	-	25	75	100	3	100%
CST-3606		Micro Controller & Embedded systems								
CST-3615	Professional Elective Lab Course	Computer Graphics Lab	-	-	2	25	-	25	1	100%
CST-3616		Micro Controller & Embedded systems Lab								
MOC-3611	Massive Open Online Course	MOOC	-	-	2	25	-	25	1	100%
TOTAL			12	6	4	200	450	650	20	

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Ritu Sharma
19/07/2024

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: ECE/ELECTRICAL/COMPUTER/MECHANICAL/IT

CREDITS: 3

SEMESTER: 6th

COURSE NO.: HMT-7601

COURSE TITLE: FUNDAMENTALS OF ECONOMICS

DURATION OF EXAM: 3HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

On completion of the course the students will be able to	
CO1	To understand micro economic concepts such as demand & utility analysis, consumer behavior and to carry out economic analysis in the decision making process.
CO2	To develop the skills to create the goods and services at minimum cost by studying in detail about the production and cost analysis.
CO3	To Understand about the market structure and pricing decisions.
CO4	To understand the concept of national Income, Banking, Inflation, Problem of Unemployment and Poverty in India.

Section A

Unit 1-Meaning and Importance of Economics: Introduction, Meaning, Scope of Economics; Role and responsibilities of economist, Relationship of economics with other disciplines: Importance of Economics in decision making, the basic process(steps) of decision making. (5 hours)

Unit 2-Demand Analysis: Introduction, Meaning of demand and Law of Demand, factors affecting demand; exceptions to the law of demand; Elasticity of Demand (Price, income and cross elasticity of demand) (6 hours)

Unit 3-Consumer Behaviour: Cardinal utility analysis: Concept: law of diminishing marginal utility: law of equi marginal utility, Ordinal utility analysis: meaning and properties of Indifference curves and utility maximization (consumer equilibrium). (5 hours)

Unit 4- Production and cost Analysis: Meaning of Production function, Isoquants (meaning and properties) law of variable proportions, law of returns to scale, Cost Analysis: Concept of Fixed, Variable, Total, Average & Marginal Costs & their relationships in short run. (6 hours)

Section B

Unit 5- Market structure and pricing decisions - Introduction, Perfect Competition, monopoly (Price-Output Determination under Perfect Competition and monopoly in short run and long run); kinked demand curve analysis of price stability in Oligopoly (Sweezy's model) (5 hours)

Unit 6-Macroeconomics-Meaning & Concept of National Income; Different methods of calculating national income and difficulties in measuring national income. (5hours)

Unit 7-Banking and Inflation-Functions of central bank and methods of credit control: functions of Commercial bank and methods of credit creation, Inflation: Types, effects and methods to control inflation. (6 hours)

Unit 8- Problem of Unemployment and Poverty in India: Meaning, types and causes of Unemployment; Poverty: meaning and causes. Poverty alleviation and employment generation programmes in India. (6 hours)

BOOKS RECOMMENDED :

1. K.K.Dewett : Modern Economic Theory
2. H.L Ahuja : Advanced Economic Theory
3. M.L. Jhingan : Macro Economic Theory
4. P.N Chopra : Business Economics/Advanced Eco. Theory
5. D.N. Dwivedi :Managerial Economics
6. A. Koutsoyiannis : Modern microeconomics
7. Meenu Agrawal: Economic Reforms, Unemployment and Poverty
8. K.R. Gupta: Poverty in India

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE/IT
SEMESTER:6th
COURSE NO: CST-3601
COURSE TITLE: CYBER SECURITY
DURATION OF EXAM: 3 HOURS

CREDITS:3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the course the student will be able to	
CO1	Understand the concept of Cyber security and its challenges .
CO2	Comprehend the various cyber-crimes and their associated legal remedies.
CO3	Analyze the privacy and security concerns on online Social media platforms and digital banking along with reporting procedures and RBI Guidelines .
CO4	Exhibit Knowledge to secure Systems, protect personal data and configuration of Security mechanisms.

Section- A

Introduction to Cyber Security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security. **(08 hours)**

Cyber Crimes & Cyber Laws: Classification of Cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, Cybercriminals modus-operandi , Reporting of cyber-crimes, Remedial and mitigation measures, Legal perspective of cyber-crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India. **(14 hours)**

Section B

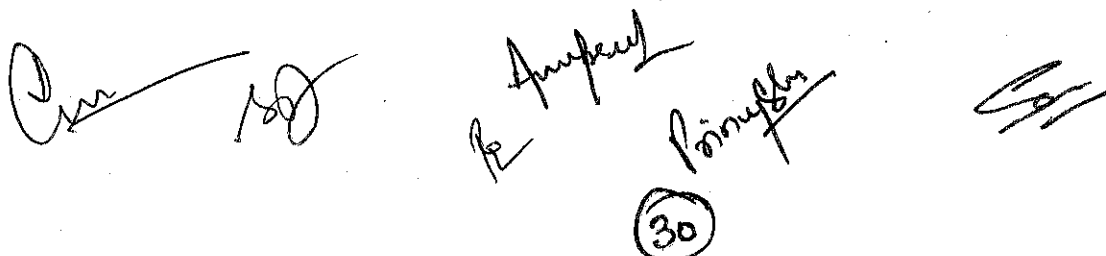
E-Commerce and Digital Payments: Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Aadhaar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. **(10 hours)**

Digital Devices Security, Tools and Technologies: End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions. **(10 hours)**

BOOKS RECOMMENDED:

1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Author Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.


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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE/IT
SEMESTE: 6th
COURSE NO: CST-3602
COURSE TITLE: COMPILER DESIGN
DURATION OF EXAM: 3 HOURS

CREDITS:3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
On completion of the course the students will be able to	
CO1	Gain a comprehensive understanding of the internal organization and behaviour of various components of a compiler and other language processors
CO2	Analyse various phases, algorithms, and techniques for designing and implementing lexical analysers and syntax parsers, as well as error handling.
CO3	Analyse various phases, algorithms, and techniques for designing and implementing lexical analysers and syntax parsers, as well as error handling.
CO4	Acquire knowledge of code optimization techniques to improve the efficiency of generated code and understand the final code generation process.

Section- A

Introduction—Languages Processors, the typical structure of a Compiler, Boot Strapping, Cross Compiler
(03 hours)

Lexical analysis –Role of Lexical Analyzer, input buffering, A simple approach to Design of Lexical Analyzers, Regular Expressions, Finite Automata, Regular expression to Finite Automata; Conversion of NFA to DFA, Minimizing the number of states of a DFA.
(07 hours)

The Syntactic Specification of Programming Languages –Definition of Grammars (Context free grammar), derivation, parse tree, ambiguity, non-context free language constructs.
(04 hours)

Basics Parsing Techniques –Parsers- Shift reduce parsing, Operator precedence parsing, LR parsers. Predictive parsers, LL(1) parser
(08 hours)

Section- B

Syntax directed translation- Syntax directed translation schemes, Implementation of syntax directed translations with examples.
(04 hours)

Intermediate code Generation - Intermediate code, postfix notation, three address code-quadruples triples, translation of Assignment statement, Boolean Expression, Statements that alter the flow of control.
(04 hours)

Symbol Table Organization –The content of symbol table, Data structure of symbol table Run- Time memory Allocation-Static and Dynamic memory allocation, Static allocation of space – Activation trees, activation records, Procedure calls, parameter passing.
(05 hours)

Error Detection and Recovery-Classification of Errors- lexical, syntactic, semantic errors with examples, Detection of syntactic error in LL and LR parsers, panic mode error recovery and other strategies
(04 hours)

Code optimization- Need of code optimization, Local and Loop optimization, DAG Representation of basic blocks, Global data flow Analysis.
(03 hours)

Code generation- Issues in the design of code generator, Peephole optimization, a simple code generator Register Allocation & Assignment.
(03 hours)

RECOMMENDED BOOKS :-

1. Aho A.V., Ullman J. D., Sethi R., Compilers Principles, Techniques and Tools, Pearson Education
2. John Levine, Tony Mason, Doug Brown, Lex and Yacc, O'Reilly
3. Kenneth C. Loudon, Compiler Construction and Practices, Thomson Publication
4. Dhamdhare, Compiler Construction. Macmillan Publication

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2024, 2025, 2026, 2027**

CREDITS: 3

BRANCH: Computer Engineering/CSE
SEMESTER: 5th
COURSE TITLE: Operating Systems
COURSE NO: CST-3603
DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

<u>COURSE OUTCOMES</u>	
At the end of the course the student will be able to	
CO1	Understand the structure, functionalities and design of an operating system, file systems and disk structure.
CO2	Acquire the knowledge about Processes, Scheduling, Synchronization and Deadlocks.
CO3	Apply various Memory management concepts to efficiently use memory.

Section - A

Introduction Concepts: - Operating System functions & Characteristics, Historical Evolution of O.S., O.S. Services, User O.S. Interface, Computer System Architecture, O.S. Design and Implementation and structure, System calls, System Programs, Virtual Machines, Spooling. **(6 hours)**

Process Management: - Study of state models, process Scheduling, Job Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple Process Scheduling. **(6 hours)**

Process Coordination: - Synchronization: Race-Conditions, critical-Section problems, semaphores, Bounded-Buffer Problem, Readers-writers Problem, Dining –Philosophers Problem. **(6 hours)**

Section- B

Deadlocks: Characteristics, Deadlock Prevention, Avoidance, Detection, Recovery. **(6 hours)**

Memory Management: Logical & Physical Address space, Contiguous & Non-Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Demand paged memory management, Page replacement, Allocation of Frames, Thrashing, Swapping & Overlays, Cache Memory. **(10 hours)**

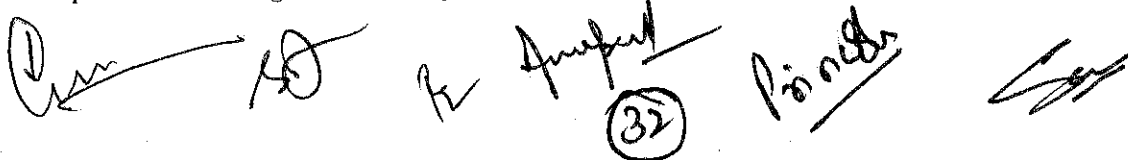
File Systems& Disk Storage: Files - file concept, file structure, types, access methods, directory structure, allocation methods (contiguous, linked, and indexed), free-space management (bit vector, linked list, grouping), Disk Structure, Disk Scheduling, Disk Management, Disk Formatting, Swap Space Management, RAID Structure. **(8 hours)**

Case Study of Smartphone Operating Systems like Android and IOS **(2 hours)**

BOOKS RECOMMENDED:

- | | |
|---|---|
| 1. Operating System Concepts | Silberschatz and Galvin, Publisher Addison Wesley Inc. |
| 2. Operating System Design & Implementation | Tanenbaum A.S, Publisher Pearson Education. |
| 3. An Introduction to Operating Systems Concepts and Practice | Bhatt and Chandra, Publisher Prentice Hall of India Publication |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



C. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the

Year May 2025, 2026, 2027, 2028

BRANCH: Computer Engineering/CSE/IT

CREDITS: 3

SEMESTER: 6th

COURSE NO. CST-3604

COURSE TITLE: DATA SCIENCE

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the fundamental concepts and significance of data science.
CO2	Proficiently use the descriptive statistics and data visualization techniques.
CO3	Apply supervised and unsupervised machine learning algorithms to solve various problems.
CO4	Evaluate the performance of machine learning models using appropriate evaluation metrics.
CO5	Understand probabilistic model principles and apply them to real-world problems.

Section-A

Introduction to Data Science: What is data science, Applications of Data Science, Data lifecycle: acquisition, cleaning, analysis, and interpretation, Ethical considerations in data science, Relation to data mining, machine learning, big data and statistics, Data sources and types, Data collection methods, Data cleaning and pre-processing techniques
(10 Hours)

Exploratory Data Analysis: Descriptive Statistics: Means, mode, median, variance, standard deviation, weighted averaging. Data visualisation techniques: Histograms, Boxplots, Scatterplots, Time series, Spatial Data Visualisation. Exploratory data mining: Introduction, Association discovery- Definition, challenges, Apriori algorithm, Clustering- Definition, Challenges.
(10 Hours)

Section – B

Machine Learning Fundamentals: Introduction to machine learning, Supervised vs. unsupervised learning, Classification vs Regression, Decision trees, Rule learners, Linear regression, logistic regression, Nearest neighbour learning. Support vector machines, K-means clustering, hierarchical clustering, and DBSCAN
(10 Hours)

Measuring performance of a model: Confusion Matrix, Accuracy, Precision, Recall, F1-Score, ROC curves, AUC-ROC, precision-recall curves, Loss functions for regression, Interpretation of results- Confidence interval for accuracy, Hypothesis tests for comparing models and algorithms.
(8 Hours)

Probabilistic Models: Introduction- Probabilities, Rule of Bayes and Conditional Independence, Naïve Bayes Classifier, Bayesian Belief Networks
(6 Hours)

BOOKS RECOMMENDED:

1. Introduction to Data Science Jeffrey Stanton and Jeffrey M. Stanton
2. Data Science from Scratch First Principles with Python" by Joel Grus

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B.Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER :6th
COURSE NO: CST-3605 (ELECTIVE-1)
COURSE TITLE: COMPUTER GRAPHICS
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Acquire the knowledge regarding Computer Graphics display technologies, graphical primitives and Illumination models
CO2	Understand the basic output primitive drawing algorithms along with 2D and 3D transformation concepts to display and clip and project the objects.
CO3	Formulate, derive the Mathematical Description for various types of transformations and Projections
CO4	Apply the primitive drawing, polygon filling, clipping algorithms and implementing projection transformations and 3D object representation models.

Section A

Computer Graphic Systems:- Introduction , Application areas of Computer Graphics, Overview of Graphics Systems, Video display devices : Vector Scan, Raster Scan Displays, Color CRT monitors , Direct View storage tubes, Flat Panel, Three-dimensional viewing devices , Displays Characteristics of Video Display Devices, Random and Raster Scan Systems, Graphics monitors and workstations, Graphical Input devices , Audio visual Input Devices, Hard copy Devices and their characteristics, Display Processor. **(04 hours)**

Scan Conversion: -Points and Lines, Aliasing effects , Antialiasing , Lines drawing algorithms : DDA algorithm, Bresenham's line algorithm, Circle generation algorithm, Midpoint circle Algorithm, Midpoint ellipse drawing algorithm , Character Generation , Polygon Filling : Seed Fill (Boundary Fill Algorithms, Flood Fill Algorithms) Scan Line , Scan converting a Character **(08 hours)**

Two Dimensional Transformation : Transformations and Viewing :-Basic 2-D Transformation: Translation, Scaling, Rotation, Reflection, Shearing , Matrix Representation, Inverse Transformations , Composite 2D Transformations **(06 hours)**

Section B

Windowing and Clipping: Window to Viewport Mapping, 2D Clipping, point clipping, line clipping procedures like Cohen -Sutherland line clipping, line clipping using non rectangular clip windows. Polygon clipping **(05 hours)**

Three Dimensional Transformations: - Geometric 3D Transformations, Coordinate Transformations, Composite 3D Transformations, Three Dimensional Display Methods **(05 hours)**

Parallel and Perspective Projections: - 3D Viewing, Parallel projections, Perspective projections, Types of Parallel and Perspective projections, Mathematical Description of Parallel and Perspective projections **(06 hours)**

Illumination Models and Shading: Light sources, Phong Illumination model, Shading algorithms: Constant Intensity Shading, Gouraud Shading, Phong Shading, Halftone Shading **(02 hours)**

BOOKS RECOMMENDED:

- | | |
|---|---|
| 1. Computer Graphics | Donald Hearn, M. Pauline Baker-phi |
| 2. Interactive Computer graphics | Newman and Sprowll-Tmh |
| 3. Computer Graphics:A Programming approach | Stevan Harrington-Tata McGraw-Hill |
| 4. Computer Graphics :Principles and practice | JD Foley and A.V Dam, S.K Feiner, J.F Hughes -Pearson Education |
| 5. Computer Graphics | Z. Xiang, R.A. Plastock:, Second Edition, Schaum's Outlines, Tata McGraw-Hill |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER :6th
COURSE NO: CST-3606 (ELECTIVE-1)
**COURSE TITLE: MICROCONTROLLER
& EMBEDDED SYSTEMS**
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the general architecture of microcontroller and operation of embedded system using Aurdino and Raspberry pie.
CO2	Understand, write structured and well-commented programs in assembly language with an ability to test and debug them in the laboratory.
CO3	Classify and apply the instruction set of 8051 and AVR microcontrollers and the use of different instructions.
CO4	Interface memory and various I/O devices with microcontrollers.

Section- A

8051 Microcontroller: Introduction to Microcontrollers, Evolution, Microprocessors vs. Microcontrollers, MCS-51 Family Overview, Important Features, Architecture. 8051 Pin Functions, Architecture, Addressing Modes, Interrupt Organization, Processing Interrupts, Serial Port Interrupts, External Interrupts, and Interrupt Service Routines. Memory Address Decoding, 8031/51 Interfacing with External ROM and RAM **(10 hours)**

Assembly programming and instruction of 8051: Introduction to 8051 assembly programming, Assembling and running an 8051 program, Data types and Assembler directives, Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming.

8051 interfacing with 8255- Programming the 8255, 8255 interfacing, C programming for 8255. **(12 hours)**

Section- B

Embedded system: concept - characteristic features - architecture - application areas - specialties - embedded operating system - types - general architecture of OS - kernel - categories of embedded OS - examples - concept of arduino and raspberry pie development boards. **(10 hours)**

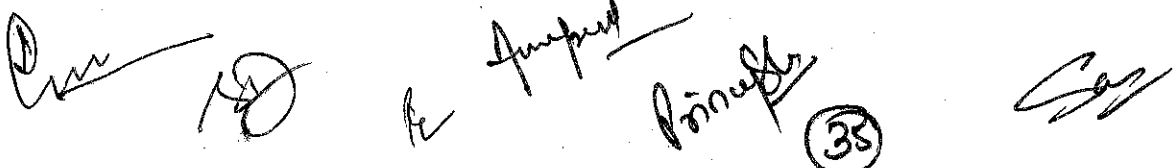
Introduction to AVR microcontroller: Overview of AVR family, AVR Microcontroller architecture, status register, Special function registers, RAM, ROM & EEPROM space, On-Chip peripherals, ATmega32 pin configuration & function of each pin, Fuse bits of AVR. **(05 hours)**

AVR assembly language programming: AVR data types and assembler directives, addressing modes of AVR, Data transfer, Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions, AVR studio setup for assembly language programming, AVR I/O Port Programming, Time delay loop, Look-up table. **(08 hours)**

BOOKS RECOMMENDED:

- | | |
|---|--|
| 1. The 8051 Microcontroller and Embedded Systems, second edition, Pearson publications | Mazidi Muhammad Ali |
| 2. The AVR Microcontroller and Embedded Systems using assembly and C - - Pearson Education. | Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi |
| 3. Programming and Customizing the AVR Microcontroller | Dhananjay Gadre, McGraw Hill Education |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 6th
COURSE NO: CSP-3615
COURSE TITLE: COMPUTER GRAPHICS
LAB

CREDITS:1

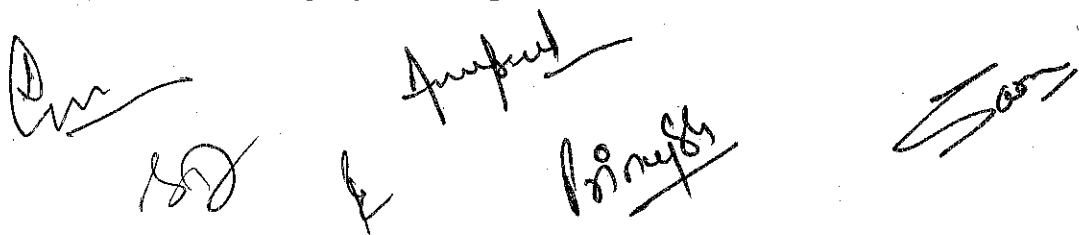
L	T	P	Marks
-	-	2	25

<u>LABORATORY OUTCOMES</u>	
At the end of the semester, the students will be able to	
CO1	Implement line, Circle, Ellipse using various algorithms.
CO2	Perform various Transformations on graphical primitive.
CO3	Implement algorithm to Clip Line and Polygon .
CO4	Implement algorithm to fill the Polygon

Lab Experiments:

Experiment 1	Simple DDA line drawing program
Experiment 2	Bresenham's line drawing program.
Experiment 3	Bresenham's circle drawing algorithm
Experiment 4	Implement midpoint circle drawing algorithm
Experiment 5	Implement ellipse drawing algorithm
Experiment 6	Performing 2D transformations
Experiment 7	Performing 3D transformations
Experiment 8	Polygon Filling
Experiment 9	Cohen Sutherland line clipping program
Experiment 10	Sutherland Hodgeman Polygon Clipping

NOTE: Additional Lab experiments/ practicals will be performed based on the course content requirements. Implement these programs using C/C++



**L. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 6th
COURSE NO: CSP-3616
**COURSE TITLE: MICROCONTROLLER & EMBEDDED
 SYSTEMS LAB**

CREDITS:1

L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES

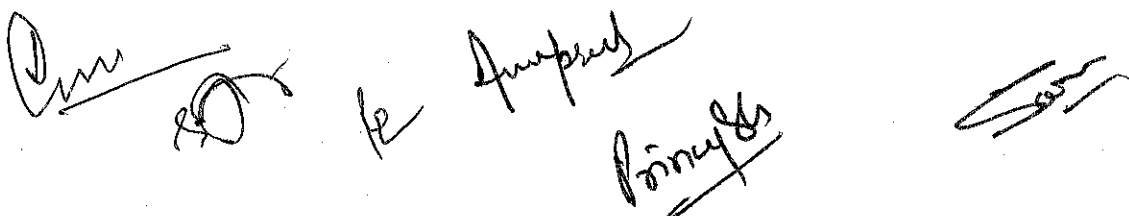
At the end of the semester, the students will be able to

CO1	Design, code and debug Assembly Language programs to implement simple programs.
CO2	Interface peripherals like switches, LEDs, stepper motor, Traffic lights controller, etc.
CO3	Configure computer systems and do various port programming.
CO4	Apply programming language using AVR microcontroller kit.

Lab Experiments:

Experiment 1	Study and familiarization of 8051 Microcontroller trainer kit
Experiment 2	Assembly Language Program for addition of 8-bit numbers stored in an array
Experiment 3	Assembly Language Program for Multiplication by successive addition of two 8-bit numbers
Experiment 4	Assembly Language Program for finding largest no. from a given array of 8-bit Numbers
Experiment 5	Assembly Language program to arrange 8-bit numbers stored in an array in ascending Order
Experiment 6	Stepper motor control by 8051 Microcontroller
Experiment 7	Interfacing of 8-bit ADC 0809 with 8051 Microcontroller
Experiment 8	Interfacing of 8-bit DAC 0800 with 8051 Microcontroller and Waveform generation using DAC
Experiment 9	Implementation of Serial Communication by using 8051 serial ports
Experiment 10	Study of AVR Controller.
Experiment 11	Assembly Language Programs using AVR.

NOTE: Additional Lab experiments/practical will be performed based on the course content requirements.


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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 6th
COURSE NO: MOC-3611
COURSE TITLE: MOOC

CREDITS:1

L	T	P	Marks
-	-	2	25

The students shall select a MOOC of 4 weeks/minimum 40 hours; available at the time on any reputed platform and shall pursue the same after due approval, from the departmental Academic Committee. However, the selected MOOC course should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the MOOC course will be under the supervision of the teacher In charge of the department. The Departmental Academic Committee shall assess the student work based on a presentation of the course undertaken/ project completed along with a relevant course completion certificate.

Note :- In Case a student opts for a 4 week NPTEL Course the following points need to be followed:

i) The Course is declared pass in the semester only after the production of the NPTEL Certificate, by the student. In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be awarded by NPTEL and hence the student will be deemed to have failed in the said Course. The student has to appear again in the NPTEL examination conducted either in the same course or any other course as per the next semester schedule of NPTEL and earn the certificate by passing the exam.

ii) The students must select their College name while registering for a particular course. Thereafter, the option of sharing the result with the institute also needs to be selected. Only those certificates will be accepted and validated by department whose information is shared by NPTEL to college authorities.

No certificate will be accepted without this and student will be marked absent in the college records

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: ELECTRICAL/COMPUTER IIT
SEMESTER: 7th

CREDITS: 3

COURSE NO.: HMT-7701

COURSE TITLE: INTERNATIONAL ECONOMICS

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the concept of international trade in general as well as with the classical and modern theories.
CO2	Analyze the concept of foreign exchange rate and exchange control in detail and hence shall be able to understand the international market conditions.
CO3	Compete in international corporate world by understanding the various concepts of terms of trade like tariffs, quotas etc.
CO4	Understanding the concept of balance of trade, balance of payment and role of international organizations in economic development.

Section A

UNIT - I: Concept of International Trade

Meaning, Significance and scope of International Economics, concepts of internal, interregional and international trade and their comparison, Theories of international trade: Absolute Cost Advantage, Comparative Cost Advantage, Opportunity cost theory (features, assumptions and limitations) **(07 hours)**

UNIT - II: Theories of International Trade

Modern Theories of International Trade: Heckscher- Ohlin Theory, Rybznski Theorem, The Stolper – Samuelson Theorem. **(06 hours)**

UNIT- III: Terms of trade: Concepts and Significance

Meaning, Concept and significance of Terms of Trade, Different Terms of Trade Indexes (Net Barter, Gross Barter, Income, Single and Double Factoral), Factors influencing Terms of Trade. **(07 hours)**

Section B

Unit- IV: Foreign Exchange Rate

Meaning, Types of Foreign exchange rate, Fluctuating Exchange Rate system, Fixed Exchange Rate system
Exchange Control: Meaning, Features, Objectives and methods of Exchange Control; Merits and Demerits of Exchange Control. **(07 hours)**

Unit- V: Trade barriers

Tariffs (Meaning, classifications and their impact), Import Quotas: Meaning, types and effects of Quotas, devaluation (concept, merits and demerits). **(06 hours)**

Unit VI: Balance of payment and International organisations

Concept and components of balance of trade and balance of payment, equilibrium and disequilibrium in BOP, consequences of disequilibrium in BOP, Various measures to correct deficit in BOP. International organisations: IMF, World bank, World Trade organisations- objectives, functions. **(07 hours)**

BOOKS RECOMMENDED

1. International Economics -H.G Mannur
2. International Economics -Paul R. Krugman and Maurice Obstfeld
3. International Economics - Dominick Salvatore
4. International Economics - Sodersten Bo
5. International Economics - OsShrivastva
6. International Economics - M.L. Jhingan

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE/IT
SEMESTER: 7th
COURSE NO.: CST-3701
COURSE TITLE: NETWORK SECURITY
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Understand about the significance of Network Security.
CO2	Know about key principles/policies of Cyber Security.
CO3	Acquire knowledge about the Latest Concepts & Techniques in Cryptography.
CO4	Analyze Private/Public Key Management Basics and Implement Digital signature, MD5 & Authentication Protocols

Section A

Introduction: Introduction to N/w Security, Security Approaches, Security Policies, Principle of Security, Introduction to common attacks, IP-Spoofing, Model for N/w Security, Encryption & Decryption. **(06 hours)**

Cryptography: Concepts & Techniques: Introduction to Cryptography, Private/Public Key Cryptography, Plain Text, Cipher Text, Substitution and Transposition techniques, Steganography. **(06 hours)**

Symmetric & Asymmetric Key Cryptography: Overview, Algorithm types & modes, DES scheme, RC5, Blowfish, AES scheme, Differential and Linear Crypto analysis, Key distribution and management. Overview, Key management basics, RSA Algorithm, Digital signatures, Message digest, Hash function (SHA), Message Authentication Code (MAC), Authentication protocols. **(08 hours)**

Section- B

IP Security: Architecture, Authentication header, Encapsulating, Security payload, Security associations, Key management, E-mail security, Web security, Viruses & related threats. **(04 hours)**

Firewalls & Intrusions: Design principles, Characteristics, Types of firewalls, Intruders, Audit Records, Intrusion Detection Systems. **(08 hours)**

Information Security & Cyber Laws: Information security & laws, IPR, Patent law, Copyright law, Overview of cyber-crimes, Security metrics – Classification, Benefits, Security tools–Attack & Penetration Tools, Defensive tools. **(08 hours)**

BOOKS RECOMMENDED:

- | | |
|---------------------------------------|---------------------|
| 1. Cryptography & Network Security | Atul Kahate |
| 2. Cryptography & Network Security | William Stallings |
| 3. Computer Networks (Latest Edition) | Andrew S. Tanenbaum |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE

CREDITS: 3

SEMESTER: 7th

COURSE NO.: CST-3702

COURSE TITLE: SOFTWARE ENGINEERING

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Understand the software engineering lifecycles by demonstrating competence in communication, planning, analysis, design, construction and deployment.
CO2	Comprehend the Software Project management using Estimation and Design techniques.
CO3	Demonstrate the Design of a Software Project using DFD's .
CO4	Work as an individual and as part of a multidisciplinary team to test and deliver quality software ; engaging in life-long maintenance.

Section- A

Introduction to Software Engineering: - Software: The Process and the product, Software characteristics, Software myths, Software Engineering: A layered technology, Process framework, and Software Engineering Paradigms: Sequential, Incremental, Evolutionary and Specialized Process Models. **(08 hours)**

Software Planning and Project Management: - Software Project Management Process: Software scope, Resources, Software metrics, Software project estimation, Decomposition techniques, Empirical estimation model: COCOMO, Software project scheduling, Risk analysis, Software acquisition. **(08 hours)**

Software Requirements Analysis: Requirement analysis, Analysis principles, Analysis modelling. Design Engineering, The design process and Concepts, Effective modular design, Data design, Architectural design, procedural design, Interface Design. **(06 hours)**

Section- B

Data Flow Oriented Design: Data Flow Diagrams transform analysis, Transaction analysis, Transform and transaction mapping. **(06 hours)**

Software Quality Assurance: - Software quality and software quality assurance, Formal technical reviews, Software quality metrics: McCall's quality factors, Software reliability. **(05 hours)**

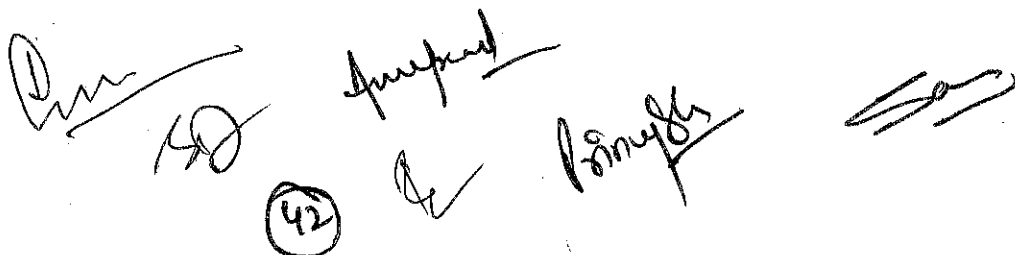
Software Testing: - Software testing fundamentals, White box testing, Basic path testing, Control structure testing, Black box testing. Software testing strategies, Unit testing, Integration testing, Validation testing, System testing. **(08 hours)**

Software Maintenance: Definition, Maintenance characteristics, Reverse Engineering, Re-engineering. **(03 hours)**

BOOKS RECOMMENDED:

1. Software Engineering, A practitioner's approach: R.S. Pressman
2. Integrated approach to Software Engineering Pankaj Jalote
3. Software Engineering: M.L. Shooman

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE

CREDITS: 3

SEMESTER: 7th

COURSE NO.: CST-3703

COURSE TITLE: ARTIFICIAL INTELLIGENCE

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Remember and understand the concept and fundamental methods of AI.
CO2	Apply basic AI algorithms to solve the problems and Demonstrate an understanding of various searching algorithms
CO3	Identify different knowledge representation techniques used in AI
CO4	Demonstrate the implementation of fuzzy logic in expert systems.
CO5	Comprehend the different Expert Systems architectures and their applications in AI

Section- A

Introduction: - AI History, The AI problems, AI techniques, AI Applications, AI tasks, Goals of Artificial Intelligence, Advantages and disadvantages of AI, Types of AI, Types of Agents, Turing Test in AI, Production system, Problem characteristics, Production system characteristics. **(08 hours)**

Problem solving techniques: Solving Problems by searching: State space search, control strategies, Blind Search: Breadth first Search, Depth First Search, Iterative Deepening depth first search, heuristic search, problem characteristics, production system characteristics., Heuristic Search Techniques: Generate and test, Hill climbing, best first search, A* search, AO* search, Constraint satisfaction problem, Game Playing: Min-Max Search, Alpha-Beta Pruning. **(12 hours)**

Knowledge Representation Issues: - Representation and mappings, Approaches to knowledge representation, Issues of knowledge representation, The frame problem, Semantic networks, procedural vs declarative knowledge **(06 hours)**

Section- B

Non-monotonic and Statistical reasoning: - Reasoning In AI, Types of Reasoning, Introduction to non-monotonic reasoning, Logics for non-monotonic reasoning, Probability & Bayes Theorem, Certainty Factors & Rules Based Systems, Bayesian networks, Dempster Shafer Theory, Fuzzy sets, Fuzzy logic, Defuzzification **(08 hours)**

Using Predicate Logic: - Representing simple facts in logic, Propositional Logic, First Order Logic: Syntax and Semantics, clausal form conversion, unification, resolution **(06 hours)**

Introduction to Expert system: Expert systems, Expert system examples, Expert System Architectures, Rule based Expert systems, Non Monotonic Expert Systems, Decision tree based Expert Systems. **(07 hours)**

BOOKS RECOMMENDED:

- | | | |
|---|---|--------------------------|
| 1 | Artificial Intelligence | Elaine Rich Kevin Knight |
| 2 | Principles of A.I Expert system development | David W. Rolston. |

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE

CREDITS: 3

SEMESTER: 7th

COURSE NO.: CST-3704

COURSE TITLE: CLOUD COMPUTING

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to	
CO1	Learn about the concepts of cloud infrastructure and services.
CO2	Understand cloud computing models, architecture ,security implications and storage in cloud
CO3	Security challenges associated with cloud computing and learn best practices for securing cloud environment
CO4	To analyze the operation, implementation and performance of various cloud computing platforms

Section- A

Introduction and Evolution of Computing Paradigms: Limitations of Traditional Computing Approaches, three layers of computing, three layers in traditional computing, Evolution of cloud computing: cluster Computing, Grid Computing, Utility Computing, Computing, Cloud Computing, history development :Distributed Systems, Virtualization, Web Service-Oriented Computing, Utility -Oriented computing, Building Cloud Computing Environments: application development, Infrastructure and System Development and benefits cloud computing.

(07 hours)

Cloud Issues and Challenges: Cloud computing issues and challenges like Resource pooling, sharing and provisioning, Cost Management, scaling in the cloud, capacity planning, Load balancing, Security issues, Privacy and Compliance, Service-oriented Architecture, Cloud bursting, SLA management in cloud computing.

(08 hours)

Cloud Computing Architecture: Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds , SaaS and Paas : Salesforce.com and Force.com

(10 hours)

Section B

Classification of Cloud Implementations: Amazon Web Services, The Elastic Compute Cloud (EC2), The Simple Storage Service (S3), The Simple Queuing Services (SQS), Google App Engine - PaaS, Windows Azure, Aneka, Hadoop, A Comparison of Cloud Computing Platforms.

(08 hours)

Virtualization: Virtualization, Advantages and disadvantages of Virtualization, Types of Virtualization: Resource Virtualization i.e. Server, Storage and Network virtualization, Migration of processes, VMware vCloud – IaaS

(06 hours)


Cloud based Data Storage: Introduction No-SQL databases, Map- Reduce Programming model and implementation, Hadoop, Task Partitioning, Data Synchronization, Distributed File system, Data Replication

(06 hours)

BOOKS RECOMMENED:

1. Raj Kumar Buyya, Christian Vecchiola, S.Thamarai, Mastering Cloud Computing
2. Raj Kumar Buyya, James Broberg, Andrezej M.Goscinski, Cloud Computing: Principles and paradigms, MIT Press (2011).
3. Michael Miller, Cloud Computing, Que Publishing (2008).
4. Sandeep Bhowmik, Cloud Computing, Cambridge University Press.
5. Anthony Velte, Toby Velte and Robert Elsenpeter, Cloud Computing: A practical Approach, Tata McGrawHill (2009).

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE/IT
SEMESTER: 7th
COURSE NO.: CST-3705
COURSE TITLE: BLOCKCHAIN TECHNOLOGIES
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Understand the fundamental characteristics of block chain.
CO2	Demonstrate the application of hashing and public key cryptography in protecting the blockchain
CO3	Perform a transaction on different test nets and Develop smart contracts in Ethereum framework.
CO4	Learn applications of Blockchain in real world sceneries

Section-A

Overview: Introduction, Basic Concepts, Evolution, Possibilities, Challenges and Future prospects. **(08 hours)**

Blockchain in Depth: Building Blocks of Blockchain technology, Cryptography in Blockchain, Distributed Consensus, Forking in Blockchain, Smart Contracts, Crypto Assets and Wallets **(12 hours)**

Blockchain for Enterprises: Introduction to Enterprise Blockchain, Enterprise Blockchain Architecture, Enterprise Blockchain Platform. **(08 hours)**

Section-B

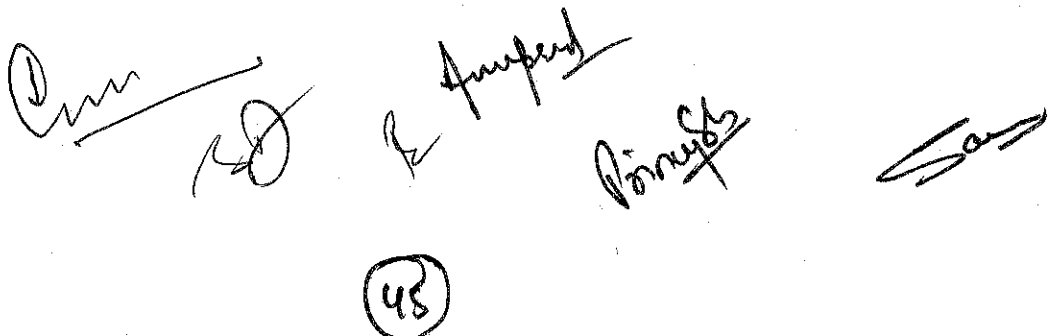
Introduction to Ethereum Blockchain: Ethereum Basics, Solidity Smart Contract Programming for Ethereum Blockchain, Creating a dApp on Ethereum Blockchain. **(12 hours)**

Emerging Applications of Blockchain in industry: Central Bank Digital Currency (CBDC), Regulatory Discussions, Emerging Risks, Metaverse, etc. **(06 hours)**

BOOKS RECOMMENDED;

- 1 Blockchain Revolution Don and Alex Tapscott Pearson, Latest Edition
- 2. InfosysSpringboard https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01255779688268595211_shared/overview

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.


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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 7th
COURSE NO: MOC-3704
COURSE TITLE: SWAYAM / NPTEL

CREDITS:3

L	T	P	Marks
2	1	-	100

The department shall offer the 12 weeks NPTEL course out of the list of courses listed by NPTEL around the time of commencement of the semester.

The courses offered shall be related to the core stream but should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the NPTEL course will be under the supervision of the faculty Incharge of the department.


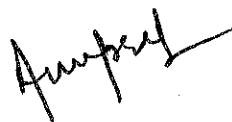
The NPTEL certification course comprises of Assignments (25%) and Proctor Examination (Online examination MCQ's based = 75%) conducted at the end of the semester by IIT Madras as per notified schedule.

The marks obtained by the student in the NPTEL certification course will be tabulated by the concerned department.

Note :-

- i) *The Course is declared pass in the semester only after the production of the NPTEL Certificate, by the student. In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be awarded by NPTEL and hence the student will be deemed to have failed in the said Course. The student has to appear again in the NPTEL examination conducted either in the same course or any other course as per the next semester schedule of NPTEL and earn the certificate by passing the exam.*
- ii) *The students must select their College name while registering for a particular course. Thereafter, the option of sharing the result with the institute also needs to be selected. Only those certificates will be accepted and validated by department whose information is shared by NPTEL to college authorities.*

No certificate will be accepted without this and student will be marked absent in college records.



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE/IT
SEMESTER: 7th
COURSE NO: CSP-3711
COURSE TITLE: NETWORK SECURITY LAB

CREDITS:1

L	T	P	Marks
-	-	2	25

LABORATORY OUTCOMES

After Completion of this course the student will be able to: -

CO1	Implementation of Encryption /Decryption Algorithm using C/C++.
CO2	Implementation of Symmetric Cryptography Algorithm using C/C++.
CO3	Implementation of Asymmetric Cryptography Algorithm using C/C++.
CO4	Implementation of Firewalls and Study of Information Security Tool

Lab Experiments:

Experiment 1	To implement the simple substitution technique named Caesar cipher using C language.
Experiment 2	To write a C program to implement the Play fair Substitution technique.
Experiment 3	To write a C program to implement the Hill Cipher substitution technique.
Experiment 4	To write a C program to implement the Rail Fence Transposition technique.
Experiment 5	To write a C program to implement the Data Encryption Standard (DES).
Experiment 6	To write a C program to implement the RSA Encryption algorithm.
Experiment 7	To implement the Diffie-Hellman Key Exchange algorithm using C language.
Experiment 8	To write a C program to implement the MD5 hashing technique.

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 7th
COURSE NO: SIT-3711
COURSE TITLE: SUMMER TRAINING-II

CREDITS:2

L	T	P	Marks
-	-	-	50

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Interact and study with a range of students and to practice multiple management skills, including communication, independent action and teamwork.
CO2	Understand the engineering code of ethics and be able to apply them as necessary.
CO3	Demonstrate knowledge of practical application of training.

Students are required to undertake 4 to 6 weeks Practical Training during the summer vacations in the field of Computer Engineering and applications in Govt./Semi-Govt./Private sector. Thereafter, each student shall be required to submit a report on the practical training to the department for evaluation.

OR

The students can opt to undertake an online course / MOOC (related to the discipline) from a reputed platform of not less than 60 hours (with Certificate).

OR

The students have an option to take an 8 week SWAYAM/NPTEL Course and earn a certificate for the same.

Guidelines for evaluation of Practical Training: The evaluation shall be done by the departmental committee during 5th semester. The committee shall have a convener and at least two members.

Distribution of Marks as per University statutes:

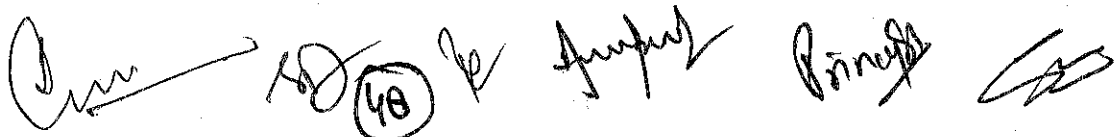
Total marks of evaluation	=50		
i. Report	=15	30%	
ii. Viva-Voce & Presentation	=25	50%	
iii. Level of IT	=10	20%	

NOTE:

- In Case a student has earned a certificate from Swayam / Nptel Platform, the marks so obtained shall be awarded on a proportionate basis.
- Due weightage will be given to those who have opted for Industrial Training outside the State as well as keeping in view the profile of that Industry.

Award of the Marks:

Marks under (i), (ii) & (iii) will be awarded by the departmental committee constituted for the purpose



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

BRANCH: Computer Engineering/CSE
SEMESTER: 7th
COURSE NO: SEM-3711
COURSE TITLE: SEMINAR

CREDITS:2

L	T	P	Marks
-	-	4	50

<u>COURSE OUTCOMES</u>	
At the end of the semester the students will be able to	
CO1	Select a topic relevant to the field of Computer engineering.
CO2	Undertake a review of the literature on the chosen topic.
CO3	Prepare and present a technical report

This will involve a detailed study of a topic of interest reproduced in the candidate's own style. For this, a student has to prepare a seminar by doing proper survey of literature, compilation of information so gathered and then presentation of the same followed by question-answer session. The report of which has to be submitted by the student well before the conduct of seminar. The handout submitted by the student will be in accordance with the standards of technical papers.

Guidelines and evaluation of Seminar in 7th semester:

The topic of the Seminar is to be finalized and approved by the departmental committee having a convener and at least two faculty members.

Distribution of Marks:

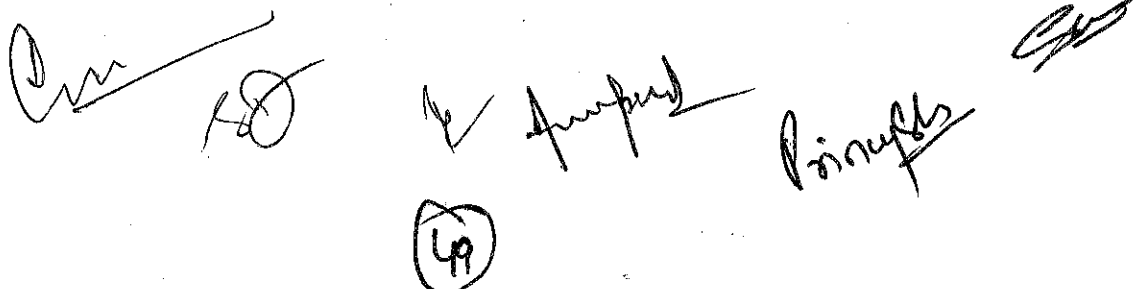
Total Marks for Seminar Evaluation = 50 marks

- | | | |
|------|----------------|-----------|
| i) | Project Report | 15 marks |
| ii) | Presentation | 25 marks |
| iii) | Attendance | 10 marks. |

Award of Marks:

Marks Under (1) will be awarded by the Seminar in charge.

Marks Under (2) and (3) will be awarded by the Departmental committee constituted for the purpose



**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year December 2025, 2026, 2027, 2028**

CREDITS:0

BRANCH: E&C/CSE/IT

SEMESTER:7th

COURSE NO: NCC-6701

COURSE TITLE: DISASTER MANAGEMENT

L	T	P	
2	-	-	Satisfactory/Unsatisfactory

COURSE OUTCOMES

At the end of the semester the students will be able to

CO1	Identify various types of disasters, their causes and Impacts
CO2	To understand the disaster management principles, objectives and approaches
CO3	To understand various elements of disaster management.
CO4	To study the modern techniques used in disaster mitigation and management

Module I

Introduction to Disaster Management: Define and describe disaster, hazard, emergency, vulnerability, risk and disaster dimensions. Important phases of Disaster Management Cycle. Disasters classification- Natural disaster (floods, draught, volcanoes, earthquakes, tsunami, landslides, forest fires etc.); manmade disasters (industrial pollution, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.)

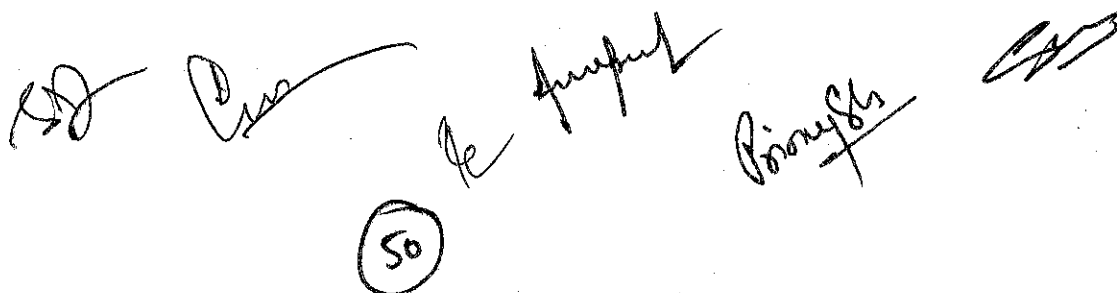
Module II

Disaster Management: principles, objectives, and approaches, psychological and social impacts of disaster, impact of disaster on family, businesses, role of NGOs, community – based organizations and media. Disaster Mitigation: Hazard assessment, Vulnerability assessment, and Risk assessment. Emergency Management Systems (EMS): Emergency medical and essential public health services, response and recovery operations.

BOOKS RECOMMENDED:

1. Disaster Management BY Harsh K Gupta
2. Disaster Management Techniques and Guidelines BY B K Singh
3. Disaster Risk Reduction in South Asia BY Pradeep Sahni
4. Disaster management, A P H Publishers BY Sharma S.R

NOTE: Evaluation of the course. There will be internal evaluation based on two internal sessional tests of 30 marks each.


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B. Tech. Computer Engineering/Computer Science & Engineering 8th Semester Examination to be held in the Year May 2026, 2027, 2028, 2029

SCHEME-A

B. Tech. 8th Semester

Contact Hrs:26

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL	Credits	% Change
			L	T	P	Internal	External			
CST-3801	Professional Core Course	Advanced Machine Learning	2	1	0	25	75	100	3	100%
CST-3802	Professional Core Course	Green Computing	2	1	0	25	75	100	3	100%
MOC-3811	Massive Open Online Course	MOOC	0	0	2	25	-	25	1	100%
CSP-3811	Professional Core Course	Advanced Machine Learning Lab.	-	-	2	25	-	25	1	100%
PRJ-3811	Project	Project	-	-	16	150	50	200	8	100%
TOTAL			4	2	20	250	200	450	16	

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in
the Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE
SEMESTER: 8th
COURSE NO.: CST-3801
COURSE TITLE: ADVANCED MACHINE
LEARNING
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Apply advanced feature engineering techniques to enhance the performance and accuracy of ML models.
CO2	Implement and evaluate ensemble learning methods and advanced regression and classification models.
CO3	Design, train, and optimize neural networks using deep learning frameworks.
CO4	Pre-process textual data and develop NLP models for tasks such as text classification & sentiment analysis.
CO5	Analyze and forecast time series data using advanced time series models and techniques.

Section – A

Feature Engineering and Pre-processing: Data Cleaning (Handling missing values, outlier detection and treatment), Feature Scaling (Normalization & standardization), Feature Selection (Filter, Wrapper and Embedded methods), Feature Extraction (PCA and LDA), Data Transformation (Log transforms, polynomial features) **(8 Hours)**

Advanced Models and Ensemble Methods: Regularization Techniques (Ridge regression and Lasso regression), Advanced Regression Models (Decision tree regression, Random Forest regression, Gradient Boosting regression), Advanced Classification Models (Multi-class classification, One-vs-Rest (OvR), One-vs-One (OvO)), Ensemble Methods (Bagging, Boosting, Stacking and voting classifiers). **(12 Hours)**

Section – B

Neural Networks and Deep Learning: Introduction to Neural Networks: Perceptron, multi-layer perceptron, activation functions, Deep Learning Frameworks: Tensor Flow, Keras, PyTorch, Training Neural Networks: Backpropagation, gradient descent, optimizers (SGD, Adam), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Overfitting and Regularization in Neural Networks **(10 Hours)**

Natural Language Processing (NLP): Text pre-processing (Tokenization, stemming, lemmatization, stopwords), Vectorization Techniques: Bag of Words, TF-IDF, Word Embeddings (Word2Vec, GloVe), Text Classification (Sentiment analysis, spam detection), Sequence Models (RNNs, LSTMs, GRUs) **(6 Hours)**

Time Series Analysis: Introduction to Time Series, Time Series Decomposition (Trend, seasonality, residuals), Time Series Forecasting Models (ARIMA, SARIMA, Prophet), State space models, Kalman filter, LSTMs **(6 Hours)**

BOOKS RECOMMENDED:

1. "Feature Engineering for Machine Learning: Principles and Techniques for Data Scientists" by Alice Zheng and Amanda Casari
2. "Ensemble Methods: Foundations and Algorithms" by Zhi-Hua Zhou
3. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
4. "Speech and Language Processing" by Daniel Jurafsky and James H. Martin
5. "Time Series Analysis and Its Applications: With R Examples" by Robert H. Shumway and David S. Stoffer

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in
the Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE

CREDITS: 3

SEMESTER: 8th

COURSE NO.: CST-3802

COURSE TITLE: GREEN COMPUTING

DURATION OF EXAM: 3 HOURS

L	T	P	Marks	
			External	Internal
2	1	0	75	25

COURSE OUTCOMES

At the end of the semester the students will be able to

C01	To understand and learn the fundamentals of Green Computing
C02	To analyze the Green computing Grid Framework.
C03	To classify the issues related with Green compliance.
C04	To comprehend and analyze the various case studies

Section-A

FUNDAMENTALS-Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics. **(08 hours)**

GREEN ASSETS AND MODELING-Green Assets: Buildings, Data Centres, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models. **(09 hours)**

GRID FRAMEWORK-Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework. **(07 hours)**

Section B

GREEN COMPLIANCE-Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future. **(08 hours)**

CASE STUDIES-The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector. **(10 hours)**

BOOKS RECOMMENDED:

1. Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, "Green Home computing for dummies", August 2012.

NOTE: There will be eight questions of 15 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in
the Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE
SEMESTER: 8th
COURSE NO.: MOC-38#1
COURSE TITLE : MOOC

CREDITS: 1

L	T	P	Marks
-	-	2	25

The students shall select a MOOC of 4 weeks/minimum 40 hours; available at the time on any reputed platform and shall pursue the same after due approval, from the departmental Academic Committee. However, the selected MOOC course should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the MOOC course will be under the supervision of the teacher In charge of the department. The Departmental Academic Committee shall assess the student work based on a presentation of the course undertaken/ project completed along with a relevant course completion certificate.

Note :- In Case a student opts for a 4 week NPTEL Course the following points need to be followed:

i) *The Course is declared pass in the semester only after the production of the NPTEL Certificate, by the student. In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be awarded by NPTEL and hence the student will be deemed to have failed in the said Course. The student has to appear again in the NPTEL examination conducted either in the same course or any other course as per the next semester schedule of NPTEL and earn the certificate by passing the exam.*

ii) *The students must select their College name while registering for a particular course. Thereafter, the option of sharing the result with the institute also needs to be selected. Only those certificates will be accepted and validated by department whose information is shared by NPTEL to college authorities.*

No certificate will be accepted without this and student will be marked absent in the college records.

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**3. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE

SEMESTER:8th

COURSE NO: CSP-3811

COURSE TITLE: ADVANCED MACHINE LEARNING LAB

CREDITS:1

L	T	P	Marks
-	-	2	25

<u>COURSE OUTCOMES</u>	
At the end of the semester the students will be able to	
CO1	Implement and evaluate advanced machine learning models.
CO2	Apply hyper parameter tuning techniques such as grid search and random search to optimize ML models,
CO3	Develop comprehensive ML solutions by integrating various techniques learned throughout the course,

Lab Experiments:

Experiment 1	Train a machine learning model on a dataset, use grid search and random search to find optimal hyperparameters, compare tuned model performance.
Experiment 2	Train and evaluate a Bagging classifier, implement and compare boosting algorithms like AdaBoost and XGBoost, analyse performance improvements.
Experiment 3	Implement ridge regression & lasso regression and compare performance on a multivariate dataset, evaluate models using metrics like R ² and RMSE.
Experiment 4	Train and evaluate multi-class classification models, implement One-vs-Rest (OvR) and One-vs-One (OvO) strategies, compare models using accuracy and F1 score.
Experiment 5	Create a neural network with Tensor Flow/Keras, train it on a dataset like MNIST, experiment with different architectures and optimizers.
Experiment 6	Build a CNN for an image dataset, experiment with different architectures, evaluate model performance using accuracy and precision.
Experiment 7	Pre-process text data, convert text to numerical representations using TF-IDF and Word2Vec, train a text classification model.
Experiment 8	Perform time series decomposition, apply ARIMA and Prophet models for forecasting, evaluate models using MAE and RMSE.

NOTE: Additional Lab Experiments/Practical will be performed based on the course contents requirements

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE
SEMESTER: 8th
COURSE NO: PRJ-3811
COURSE TITLE: PROJECT

CREDITS: 8

L	T	P	Marks		TOTAL
			External	Internal	
0	0	16	50	150	200

COURSE OUTCOMES	
At the end of the semester the students will be able to	
CO1	Identify a problem statement from a rigorous literature survey or the industry requirements analysis.
CO2	Simulate and design a solution for the identified problem by applying acquired technical knowledge.
CO3	Develop and test the prototype/algorithm to solve the engineering problem.
CO4	Accomplish all objectives of the project in an allocated period with efficient teamwork.
CO5	Present project work orally and through a comprehensive report.

Major Project Guidelines:

After interactions with project guides/industry experts, based on comprehensive literature survey/ Industry requirements analysis, the student shall identify the title and define the aim and objectives of a project. The student is expected to work on detailed specifications, methodology, resources required, critical issues in design and implementation, and submit the project proposal within the first two weeks of semester. The student is expected to work on the design, development, and testing of the proposed project work as per the schedule.

The detailed project report is to be submitted at the end of the semester. This report includes a summary of the literature survey, detailed objectives, project specifications, design, , developed system/Algorithm, results, contributions, and innovations in project work . A copy of the certificate if awarded should also be appended to the report

Sub-distribution of marks:

For External Examiner :50
 For Internal Examiner :150

Mark distribution of internal Project work as per the University statues shall be based on:

Distribution	Mid -Sem		Internal Final	%age
Viva-Voce	25	50%	30	30%
Presentation	25	50%	30	30%
Report	--	--	40	40%
	50		100	
Total (INTERNAL)	150			

The External Evaluation of 50 marks shall be done by the External Expert and shall be based on the work done, Viva-voce and Presentation.

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**B. Tech. Computer Engineering/ Computer Science & Engineering 8th Semester Examination to be -
held in the Year May 2026, 2027, 2028, 2029**

SCHEME-B

B. Tech. 8th Semester

Contact Hrs:26

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL	Credits	% Change
			L	T	P	Internal	External			
PII-3811	Professional Industry Internship	Industry Internship	-	-	24	325	100	425	15	100%
MOC-3801	Massive Open Online Course	MOOC	0	0	2	25	-	25	1	100%
TOTAL			-	-	26	350	100	450	16	

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**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE
SEMESTER: 8th
COURSE NO: PII-3811
COURSE TITLE: INDUSTRY INTERNSHIP

CREDITS: 8

L	T	P	Marks		TOTAL
			External	Internal	
0	0	24	100	325	425

<u>COURSE OUTCOMES</u>	
At the end of the semester the students will be able to	
CO1	To provide exposure to work independently in the Industry/Organisation
CO2	To develop skills in the emerging technologies
CO3	To utilize the knowledge for seeking placements in the Industry

The Project Industrial Internship letters shall be issued to the students in the 7th Semester based on the student request application, specifying the details of the company /industry/organisation from where they intend to do their Industrial Internship; along with company's consent letter and the detailed plan of the Project/Internship to be undertaken during the 8th Semester, as per the Performa provided. The Departmental Academic Committee will finalize and approve the projects. Subsequently, an internal Supervisor shall be allotted to each student who will periodically review the student's performance during the Internship/project as decided by the department.

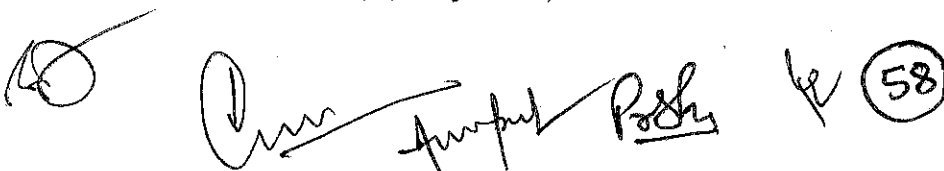
At the Completion of the Project internship, the students have to submit a detailed project/Internship report individually to the department through their internal guides and a copy of the successful completion certificate should also be appended to the report. They shall also submit a monthly progress of their Internship/project duly signed by the concerned authority in the Organisation/Company via mail to their respective Supervisor. Following guidelines must be followed by the department while permitting the students for Industrial Internship:

Case 1:

- i. Preference shall be given to the Students who are placed in the company/Industry and their respective companies/Industries etc mandates the student to work in their Industries for 8th Semester before joining the Jobs after Completion of course. The students shall have to submit an undertaking that he/she will join the company after the completion of the course.

Case 2:

- i. No student shall be allowed to undertake Industrial Internship having backlog in any subject (Theory/Practical) upto the semester for which the result is declared by the University of Jammu (Except case1).
- ii. The aggregate % of marks for applying shall be minimum 60% upto the Semester for which the result is declared by the university. (Except case 1).
- iii. Number of students permitted (case 1 and 2) in any batch for the Industrial Internship shall not be more that the 50% of the strength of the class.
- iv. If the number of applications are more, then the permission shall be granted as per the merit drawn (aggregate % of marks) upto the semester for which the result is declared by the university (Except case1).



- v. Students with offer letters from reputed organisations/Industries and National Institutions, preferably with stipend, shall be given preference.
- vi. Students who wish to initiate a Start Up shall submit a Detailed plan for the same and may be allowed if the DAC approves their proposal.

NOTE: The Final decision to allow external Project Industrial Internships shall be taken by the Department Academic Committee in accordance with the above listed guidelines and shall be binding on all the students.

Guidelines for evaluation of Industrial Internship in 8th semester:

There shall be a mid-semester online/offline evaluation, followed by an End Semester (Final) Evaluation

Sub-distribution of marks:

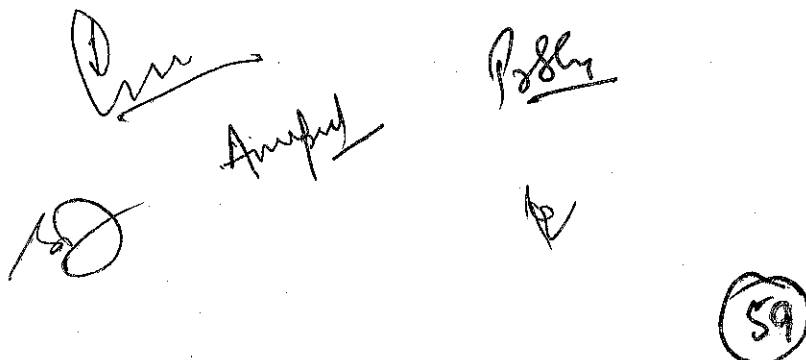
- For External Evaluation : 100
- For Internal Evaluation : 325

Sub-distribution of internal Evaluation:

- Out of the total 325 marks for internal evaluation, 125 marks are for mid-sem evaluation and 200 marks are for final internal evaluation
- Mark distribution of internal evaluation of Industrial Internship shall be as per below table:

	Distribution	Mid-Sem (Internal Supervisor)	Internal Final (Departmental Committee)	
a.	Viva-Voce	50	60	30%
b.	Presentation/Demonstration	75	60	30%
c.	Report	---	80	40%
		125	200	
	Total Internal		325	

The External Evaluation of 100 marks shall be done by the External Expert and shall be based on the Profile of Company/ Organisation, level of the work done, Viva-voce and Presentation.



 The bottom section of the page contains several handwritten signatures and initials in black ink. There are four distinct signatures: one at the top left, one in the middle left, one at the top right, and one in the middle right. At the bottom right, there is a circular stamp containing the number '59'.

**B. Tech. Computer Engineering/Computer Science & Engineering Examination to be held in the
Year May 2026, 2027, 2028, 2029**

BRANCH: Computer Engineering/CSE
SEMESTER: 8th
COURSE NO: MOC-3801
COURSE TITLE: MOOC

CREDITS: 1

L	T	P	Marks
-	-	2	25

The students shall select a MOOC of 4 weeks/minimum 40 hours; available at the time on any reputed platform and shall pursue the same after due approval, from the departmental Academic Committee. However, the selected MOOC course should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the MOOC course will be under the supervision of the teacher In charge of the department. The Departmental Academic Committee shall assess the student work based on a presentation of the course undertaken/ project completed along with a relevant course completion certificate.

Note :- In Case a student opts for a 4 week NPTEL Course the following points need to be followed:

- i) The Course is declared pass in the semester only after the production of the NPTEL Certificate, by the student. In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be awarded by NPTEL and hence the student will be deemed to have failed in the said Course. The student has to appear again in the NPTEL examination conducted either in the same course or any other course as per the next semester schedule of NPTEL and earn the certificate by passing the exam.*
- ii) The students must select their College name while registering for a particular course. Thereafter, the option of sharing the result with the institute also needs to be selected. Only those certificates will be accepted and validated by department whose information is shared by NPTEL to college authorities.*

No certificate will be accepted without this and student will be marked absent in the college records.

