

**NATIONAL INSTITUTE OF TECHNOLOGY PATNA**

Department of Computer Science and Engineering

MID SEMESTER EXAMINATION, Jan-June, 2025B. Tech (Computer Science and Engineering) 2nd Semester (Sections 1, 2, and 3)**Course: Computer Organization (CS24108)**

Full marks:30

Time: 2 hours

Answer all questions

Q.no.	Question	Marks	CO	BL
1	a) Discuss the operating steps required to complete the execution of the following two assembly language program instructions (where LOCA denotes a particular location of main memory): Load LOCA, R1 Add R1, R0	05	CO1	Remembering and Application
	b) "Computer systems that contain multiple buses achieve more parallelism."---justify this statement with proper explanation.	04	CO1	Analysis
2	a) "If a 16-bit adder is built by cascading 4-bit carry-lookahead adder blocks, the delays in developing c_{16} and s_{15} are 9 and 10 gate delays, respectively, as compared to 5 and 8 gate delays for the configuration in 16-bit carry-lookahead adder"---analyse how the mentioned gate delays come in both types of designs with all the necessary adder circuit diagrams and mathematical equations. OR a) Solve the following i. Express (-1.25) in IEEE 32-bit floating points format ii. $(8.844 \times 10^{-3}) - (2.233 \times 10^{-1})$ iii. Compute $(2365)_8 - (1574)_8$ using 7's complement method iv. What will be the equivalent decimal value if the given number uses IEEE 32 bit floating point format 0 01111110 101000000000000000000000	08	CO2	Analysis and Application
	b) Perform the multiplication between the binary forms of +12 and -7 using Booth algorithm.	03	CO2	Application
3	a) Draw all the levels of summand addition tree using 3-2 reducers for the addition of 32 summands during performing fast multiplication. How much full-adder delay will be there in this tree and why? Explain your answer. OR a) i. If a computer system's memory hierarchy were designed with a single, uniform type of memory (e.g., all registers), how would the lack of specialized memory levels (e.g., cache, RAM) impact the system's performance, data retrieval speeds, and overall efficiency in complex computational tasks. ii. Represent the following decimal numbers in both binary sign/magnitude and twos complement using 16 bits; + 512; - 29.	06 03 03	CO2 CO1	Application and Analysis
	a) Draw the diagram of datapath in a processor and find out the problems that may arise if the multiplexers MuxB and MuxY would not have been there in the datapath. OR (a) Analyze the phases of the instruction cycle (Fetch, Indirect, Interrupt, Execute), highlighting the interdependencies between each stage. Provide a detailed explanation of how time stamps are assigned to each phase, and present a comprehensive diagram that visualizes the flow of operations in the cycle. How do these stages interact in a real-world processor environment?	04	CO2	Remembering and Understanding

microprocesso
no. of Addressing length mode

no. of instr

general purpose register CPU Registers

Complex to design expensive

Op-code (16-64)

Supplement of pipeline

variable length instruction format

Program: B. Tech. [CSE (UG and DD)]

Course Code: PH24101

Full Marks: 30

Instruction refer to up Load/Store
more than 1 clock cycle 1 clock



NATIONAL INSTITUTE OF TECHNOLOGY, PATNA

MID SEMESTER EXAMINATION, March 2025

Semester: 2

Department: Physics

Course Name: Engineering Physics

Duration of Examination: 2 hours

Answer all questions. Please assume missing data suitably, if any.

Q1. (a) Discuss the theory of forced oscillations. How does the sharpness of resonance depend on damping? On what factors does the damping depend? 7+3

(b) A 4 kg mass is hung on the end of a helical string and is pulled down and let go to vibrate vertically. The mass completes 100 vibrations in 55 seconds. Calculate the force constant to the spring.

Q2. (a) Find the constant a, b, c such that the vector field $\mathbf{F} = (x+2y+az) \mathbf{i} + (bx-3y-2) \mathbf{j} + (4x+cy+2z) \mathbf{k}$ is irrotational. Describe electrostatic boundary conditions for electric field vectors across dielectric mediums. 5+5

(b) Derive an expression for the em wave propagation in the conducting medium. A point charge of 12C is located at the center of a cube of side 5m. Calculate the electric flux through each of the surfaces.

Q3. (a) What do you mean by (i) Population inversion and (ii) Active system? Find the energy stored in a one-meter length of LASER beam operating at 1mW. 5+5

(b) Explain the concept of Maxwell's displacement current and show how it led to the modification of Ampere's law.

National Institute of Technology Patna

Department of Mathematics

Mid Semester Examination : March 2025

Course Name: Engineering Mathematics – II

Course Code: MA24102

Program: B.Tech. CSE (Group-II & Group-III)

Duration: 2 Hrs

Full Marks: 30

Answer All The Questions

1. Suppose that each of three men at a party throws his hat into the center of the room. The hats are first mixed up and then each man randomly selects a hat. What is the probability that none of the three men selects his own hat?

2. If for any two events A and B prove the following.

(i) If $P(A) = P(A \setminus B)$ then A and B are mutually exclusive.

(ii) If $P(A) = a$ and $P(B) = b$, then show that $P(A|B) \geq \frac{a+b-1}{b}$.

3. Define distribution function and prove that it is right continuous in \mathbb{R} .

4. The probability density function of X is given by

$$f(x) = \begin{cases} c(4x - 2x^2), & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$

What is the value of c ? Find $P\{\frac{1}{2} < X < \frac{3}{2}\}$.

5. Let X be a random variable with distribution function

$$\begin{aligned} F(x) &= 0, & x < 0 \\ &= \frac{x}{4}, & 0 \leq x < 1 \\ &= \frac{x}{3}, & 1 \leq x < 2 \\ &= \frac{3x}{8}, & 2 \leq x < \frac{5}{2} \\ &= 1, & x \geq \frac{5}{2}. \end{aligned}$$

Find $P(1 < X \leq \frac{5}{2})$, $P(1 < X < \frac{5}{2})$, $P(1 \leq X < \frac{5}{2})$, $P(-2 \leq X < 1)$ and $P(X \geq 2)$.

6. Box A contains 5 red marbles and 3 blue marbles, and Box B contains 3 red and 2 blue. A marble is drawn at random from each box. Find the probability that (i) both the marbles are red and (ii) one is red and one is blue.

*****ALL THE BEST*****



NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID-SEMESTER EXAMINATION, MARCH 2025

Program: B.Tech. (CSE)

Department: CSE

Full Marks: 30

Semester: 2nd

Course Code: CS24107

Course Name: Web Technology

Duration of Examination: 2 hours

INSTRUCTIONS

- Answer all the questions. Assume Missing data, if any.
- Students are requested to write the Section on the top of the answer book.

Q1. [1x6 = 6M][CO3][L2] Will the following JS code snippet run? If Yes, provide the output, if NO, explain the reason along with correction required (No marks if proper reasoning not provided):

a. <code>console.log(a);</code> <code>var a = 5;</code>	b. <code>console.log(a);</code> <code>let a = 10;</code>
c. <code>{var a = 10;}</code> <code>console.log(a);</code>	d. <code>{let x = 20;}</code> <code>console.log(x);</code>
e. <code>const a = 5; a = 10;</code> <code>console.log(a*2);</code>	f. <code>const a = Your Institute Roll Number;</code> <code>a >>> 3; console.log(a);</code>

Q2. [4M][CO2][L3] Write a JavaScript code using events to increase the size of the image when someone moves the mouse over the image and the image goes back to its normal size when mouse is moved away from the image.

OR

Explain with illustrative example, How come multiple users of NIT Patna sees their public IP same. Explain how external servers/users are able to send data to different users of NIT Patna when they see all requests coming from the same public IP.

Q3. [8M][CO3][L3] Solve the following question:

- Set the background-color to red, of any `<input>` element that are in focus.
- Set a border for `` elements that have a title attribute ending with the word flower (not flowers).
- Set the background color to "red" for `<a>` elements that have a target attribute.
- Set the background-color to red, when you mouse over elements with the class "master".
- Collect user-name through a pop up box and display the collected user name in a pop-up box.
- Style all elements with a class attribute value that contains "te".
- Write a CSS code that makes the selected text red on a yellow background.
- Write a CSS code that shows a `<p>` element when a `<div>` element is Hover.

Q4. [6M][CO1][L3] You have sub-netted your class C network 200.138.1.0 with a subnet mask of 255.255.255.252. Please list the following: number of networks, number of hosts per network, the full range of the first three networks, and the usable address range from those first three networks. Additionally, identify the broadcast addresses for each network.

Q5. [3M][CO3][L3] Write a JS function to get the youngest person from following JS construct. Program should be generic in nature, so that it works for any similar construct:

```
const people = [  
  { name: "Ram", age: 38 },  
  { name: "Shyam", age: 35 },  
  { name: "Mohan", age: 21 }  
];
```

Q6. [3M][CO3][L3] Write the HTML code to create the following table.

Name		Roll Number	Grade
First Name	Last Name		
AAA	ZZZ	1001	B
BBB	YYY	1002	A



NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID SEMESTER EXAMINATION, JANUARY-JUNE 2025

Program: B.Tech CSE & DD
Course Code: Communicative English
Branch: B. Tech CSE 1, 2 & 3
Full Marks: 22.5

Semester: 2nd
Course Name: HS24101

Duration of Examination: 2 Hours

Instructions: Answer all the questions in your own words.

Faculty-Dr. Zeeshan Ali

1. Examine the role of soft skills and hard skills in shaping professional success. How can a well-balanced combination of both enhance workplace performance and career growth? Evaluate their significance and justify your response with real-world examples. (7.5 marks) CO1
2. Describe the key characteristics of an effective listener in a professional setting. Analyse how these qualities enhance leadership skills and contribute to overall organisational growth. Develop a well-structured argument by integrating relevant workplace examples. (7.5 marks) CO4
3. Prepare a précis of the passage given below. (7.5 marks) CO7

With the increasing reliance on technology, cybersecurity has become an essential concern for individuals, businesses, and governments. It refers to the protection of digital systems, networks, and data from cyber threats such as hacking, phishing, and malware. Cybercriminals exploit weaknesses in software and human behaviour to gain unauthorised access, steal data, or disrupt services.

Phishing remains a significant threat where attackers trick users into sharing sensitive information by impersonating legitimate sources. Malware, including ransomware and spyware, can compromise security by locking devices or stealing confidential information. Such attacks affect banking, healthcare, and even national security, leading to severe financial and operational losses.

To counter cyber threats, organisations and governments implement security measures such as firewalls, encryption, and multi-factor authentication. Regular software updates and cybersecurity awareness programmes also play a crucial role in mitigating risks. As cybercriminals use advanced technologies, artificial intelligence (AI) and the Internet of Things (IoT) introduce new vulnerabilities. AI-driven attacks can bypass traditional security systems, while poorly secured IoT devices pose serious risks to data privacy.

Cybersecurity is not only a technical concern but a shared responsibility. Individuals must adopt best practices, such as using strong passwords, avoiding suspicious links, and keeping software updated. Governments must enforce stringent cybersecurity laws, while businesses should invest in advanced security infrastructure. Ethical hacking also helps identify vulnerabilities before criminals exploit them.

In today's digital world, prioritising cybersecurity is essential for protecting sensitive information, ensuring privacy, and maintaining trust in online systems. A collaborative approach is necessary to stay ahead of cyber threats and build a secure digital environment for the future.