

B.TECH. EVEN MID- SEMESTER EXAMINATION, 2021-2022
DISCRETE MATHEMATICAL STRUCTURES

Time: $1\frac{1}{2}$ Hour

M.M.: 30

Note: Attempt *all* questions. All questions carry marks as shown against them.

1.(a) Use a proof by contraposition to examine the statement for its truth : [3]
 " If $m + n \geq 100$, then $m \geq 50$ or $n \geq 50$, where m and n are real numbers".

(b) Develop a program in C/C⁺⁺ to examine $(p \leftrightarrow q) \leftrightarrow (r \leftrightarrow s)$ for a tautology. [3]

2.(a) Does $s \rightarrow r$ follow logically from $p \rightarrow (q \rightarrow r)$, $\neg s \vee p$, and q ? [3]

(b) Establish the validity of the argument : [3]

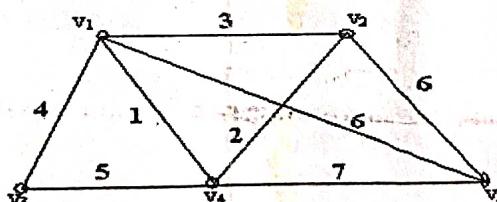
A lion is a carnivores animal.

Therefore, the head of a lion is the head of carnivores animal.

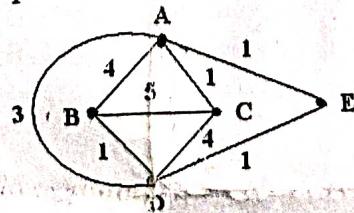
3.(a) A coding system encodes messages using strings of decimal digits. A codeword is considered valid if and only if it contains an even number of 5s. Develop a recurrence relation model for the number of valid code words of length n and find the number of code words using generating functions. [3]

(b) A ship carries 48 flags, 12 each of the colors red, white, blue and black. 12 of these flags are placed on a vertical pole in order to communicate a signal to other ship. Determine the number of signals which use at least one flag of each color. [3]

4.(a) Use Prim's algorithm (matrix version) to find MST for the weighted graph : [3]



(b) Solve the Chinese postman problem for the weighted graph: [3]



5.(a) Determine the chromatic polynomial of (i) $K_{2,s}$ (ii) $K_{1,n}$ [3]

(b) Use Quine-McCluskey's method to find a minimal sum-of-products representation for [3]

$$f(a, b, c, d) = \sum m(0, 1, 2, 3, 4, 6, 7, 8, 9, 11, 15)$$

Design a minimal logic circuit for the same.

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B.Tech (CSE/IT)

END SEMESTER EXAMINATION

EVEN SEMESTER (IV), 2021-22

ECS 256: OPERATING SYSTEMS

Time: 2:30 Hours

Max. Marks: 50

Note: Attempt all questions. All questions carry marks, as shown against them.

Course Outcomes (CO)

1. Understand types and structure of operating systems. (Understand)
2. Develop programs using system-calls related to process, memory and file management. (Apply)
3. Construct solutions for problems related to process scheduling, deadlocks and synchronization in a multi-programmed operating system. (Apply)
4. Develop appropriate solutions for memory management considering challenges due to multi-programming and virtual memory. (Apply)
5. Apply knowledge of various software and hardware synchronization tools for solving critical section problem in concurrent processes. (Apply)
6. Construct solutions for problems related to secondary storage management with an understanding of file systems and disk scheduling. (Apply)
7. Design various system protection and security mechanisms in order to design efficient software system. (Apply)

	Related CO	Marks
Q.No. 1: Attempt all parts		
• (a) What is an Operating System? What are the main Components of the computer system?	01	05
• (b) Draw and describe the simple operating system structure and layered operating system structure. What is the advantage of layered approach?	01	05
Q. No.2: Attempt all parts		
• (a) Describe the differences among short-term, medium-term and long-term scheduling. What are the actions taken by a kernel to context-switch between processes?	02	05
• (b) Explain principle of concurrency. What is Critical Section? What are the requirements of a solution to the critical section problem?	02	05
Q. No. 3: Attempt all parts:		
(a) List various performance criteria for scheduling algorithms. Five Processes A,B,C,D,E require CPU burst of 3,5,2,5 and 5 units respectively. Their arrival times in the system are 0,1,3,9 and 12 respectively. Draw Gantt Chart and compute the average waiting time of these processes for the Shortest Job First (SJF) and Shortest Remaining Time First (SRTF) Scheduling algorithms.	03	05
(b) Explain the resource-allocation graph used to precisely describe deadlocks with an example? How is the resource-allocation graph different for deadlock avoidance?	03	05

Q. No. 4: Attempt all parts:

- (a) What do you understand by fragmentation? What are the different techniques to remove fragmentation in case of multiprogramming with fixed partitions and variable partitions?

04 05

OR

What is paging? Describe how logical address is translated to physical address in a paged system. Further give reasons as to why page sizes are always kept in powers of 2

- (b) Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

04 05

How many page faults would occur for the following replacement algorithms four frames?

Remember all frames are initially empty, so your first unique pages will all cost one fault each.

- LRU replacement
- FIFO replacement

Q. No. 5: Attempt all parts

- (a) What are the major activities of an operating system in regard to file management and secondary-storage management?

05 05

- (b) Describe the various file allocation methods with their relative advantages and disadvantages.

05 05

OR

Compare the performance of three techniques for allocating disk blocks (contiguous, linked and indexed) for both random and sequential and random file access.

Date of showing evaluated answer books: 07.07.2022

No. of Printed Pages: 02

Subject Code: E C S 2 5 2

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

II B. Tech. CSE/IT Even Semester Examination, 2021-22

SOFTWARE ENGINEERING

Course Outcomes

- Understand and explain various concepts of software engineering and software life cycle development models. (Understand)
- Prepare SRS and Compute cost and effort required to complete a given project, using various estimation techniques and models. (Apply)
- Understand various concepts of Software design and Construct Data Flow Diagrams, Data Dictionaries and UML diagrams for a given software requirement specification. (Understand, Apply)
- Understand various testing techniques and use these concepts to design optimal test cases. (Understand, Apply, Analyze)
- Understand software configuration management, version control, reverse engineering, defect tracking etc. (Understand)
- Build a project report as a team which contains the requirement specification, plan, schedule and design documents based on the knowledge of software development lifecycle. (Apply)

Time: 2:30 Hrs.

Max. Marks: 50

Note: 1. Attempt all questions.
2. All questions carry marks as shown against them.

Q. No.	Questions	Marks	CO	BL
1.	Attempt all subparts of this question.	08		
	(a) Discuss the Spiral Model of Software development process and justify the statement "Spiral Model of software development accommodates good features of almost every other model".	04	1	L2
	(b) Define Software and write a brief description of various components of software.	02	1	L1
	(c) Justify the statement "Software does not wear out".	02	1	L1
2.	Attempt ALL subparts of this question	08		
	(a) Draw a complete (at least up to 2-levels) Data Flow Diagram (DFD) for a Library Management Software with common functionalities such as authentication of the user, issue and return of books by the user, report generation by the librarian and database maintenance by the library administrator etc.	04	2	L2
	(b) Write a list of various estimation methods/models and discuss the COCOMO estimation model in details.	04	2	L2
	OR Define Use Case and write most commonly accepted template for the Use Case giving description of its components.			

3.	Attempt ALL subparts of this question	08		
	(a) Discuss Coupling and Cohesion with their various types. How these measures are used to assess the strength of design of software?	04	3	L2
	(b) Draw the Control Flow Graph for the following program and calculate its Cyclomatic Complexity. <pre>void sort (int a[], int n) { int i=1, j; while (i<=n) { j = i; while (j<=i) { if (A[j]==A[i]) swap(A[j], A[i]); } } }</pre>	04	3	L3
	OR			
	Write the complete procedure to assess the number of Function Points of software under development.			
4.	Attempt ALL subparts of this question.	08		
	(a) Write a note on various types of testing of software and discuss the Boundary Value Analysis based Testing in details.	04	4	L2
	(b) Write all Input and Output domain test cases for testing based on Equivalence Class Partitioning of a program to determine the nature of roots of a quadratic equation (values of a, b, c taken from the interval [0, 100]).	04	4	L3
	OR			
	Discuss in details about various types of Reviews performed to prevent defects in software development.			
5.	Attempt ALL subparts of this question	08		
	(a) What do you understand by Software Maintenance? Discuss various types of software maintenances alongwith their relative maintenance cost.	04	5	L1
	(b) Discuss the defect amplification and removal model and Justify the statement "Early detection of errors saves the software development cost".	04	5	L1
	OR			
	Discuss the concept of Software Reverse Engineering and Re-engineering.			
6.	Attempt ALL subparts of this question	10		
	(a) Give a complete overview of the Computer Assisted Software Engineering (CASE) Tools.	05	5	L1
	(b) Take a sample problem of your own choice and give details of its various components used for professionally developing software for it.	05	5	L3

Date of showing evaluated answer books: 15 days after exams

No. of Printed Pages: 01

Roll No.

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR
End Semester Examination

Even Semester II B.Tech. 2021-22

HHS 254: ORGANIZATIONAL BEHAVIOUR

Time: 2:30 Hours

Max. Marks: 50

Note: 1. Attempt all questions.

2. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Apply organizational objectives, components and models in Indian context for better results for attaining organizational goals.
2. Demonstrate individual behavioral dimensions, learning theories, perceptual process, values & ethics with motivational techniques in stressed situations.
3. Identify mechanism for, conducive survival of individual in an organization with interpersonal understanding.
4. Ascertain group, group behavior, Team & Team building with its key role in organization.
5. Demonstrate organizational structure, organizational change, organizational development for achieving higher productivity and accomplishing goals of organization.

	Related CO: [Course Outcome]	Marks
Q. No. 1: Attempt any two. (a) Define organization and its various components. (b) What do you mean by organizational behavior, explain its feature in detail? (c) Elucidate different models of organization behavior.	CO1	5*2=10
Q. No. 2: Attempt any two. (a) Explain organizational commitment with its different types. (b) Enumerate different conditioning theories of learning. (c) What is perception? Describe the process of perception.	CO2	5*2=10
Q. No. 3: Attempt any two. (a) Discuss Johari window with suitable diagram. (b) Explain various ego states in detail. (c) Critically examine various transactions used in transactional analysis.	CO3	5*2=10
Q. No. 4: Attempt any two. (a) Explain Team and its classification. (b) What are the various techniques of group decision making. (c) What is Group dynamics? Elaborate the stages of group formation.	CO4	5*2=10
Q. No. 5: Attempt any two. (a) What is organizational structure? Explain its types with suitable diagram. (b) Distinguish between authority and power? Explain various types of power. (c) Explain the role of organizational development.	CO5	5*2=10

Date of showing evaluated answer books: 30.06.2022

No. of Printed Pages: 2

Roll No.

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B.Tech(CS/IT)

End Semester Examination
Even Semester (IV), 2021-22
EIT-252: WEB Technology

Time: 2:30 Hours

Max. Marks: 50

Note: 1. Attempt all questions. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Understand the basics of web and apply the web concepts for web application development. (Understand, Apply)
2. Understand, apply and analyze mark-up languages like HTML, DHTML, and XML for development of different web applications. (Understand, Apply, Analyze)
3. Develop interactive web applications using client-side scripting languages. (Apply).
4. Develop three-tier applications using PHP, JSP and servlets. (Apply)
5. Construct interoperable web applications using XML and related technologies. (Apply)
6. Develop and deploy web services to build the server side components in web applications. (Apply).

		Related Course Outcome (CO)	Marks
Q. No. 1:	Attempt both questions.		
(a)	What is HTTP? How do browser and server communicate using HTTP request and response? Explain with example.	CO1	(04)
(b)	Explain the difference between static web pages, dynamic web page and active web pages	CO1	(04)
Q. No. 2:	Attempt both questions.		
(a)	Compare and contrast HTML and XML showing their power, capabilities, limitations etc. Write an XML file to store information of books. Design its DTD	CO2	(04)
(b)	What are the advantages of using a Style Sheet? Explain various selector types and their usage with examples.	CO2	(04)
Q. No. 3:	Attempt both questions.		
(a)	How do you make an image clickable in HTML? Illustrate with example?	CO3	(04)
(b)	Describe History of the web in details giving features and impact of www1.0, www 2.0 and www 3.0.	CO3	(04)
Q. No. 4:	Attempt both questions.		
(a)	What are the two ways to attach a file to JSP? What are their comparative advantages and disadvantages?	CO4	(04)
(b)	Explain web governing protocols in detail?	CO4	(04)

Q. No. 5: Attempt both questions.

- (a) Write a JavaScript program to print first N odd numbers divisible by 7.
- (b) Discuss JSP in details with its life cycle? What JSP Directives? Explain Various Types of directives with suitable example?

CO5 (04)
CO5 (04)

Q. No. 6: Attempt all questions.

- (a) What are Cookies? How they are useful? Create JSP code that uses a persistent cookie (i.e. a cookie with an expiration date in the future) to keep track of how many times the client computer has visited the page. Use setMaxAge method to remain on the client's computer for one month. Display the number of page hits (i.e. cookie's value) every time the page loads.
- (b) Write a Java script function for E-mail address validation, i.e., to check if the content has the general syntax of an email or not.

CO6 (05)
CO6 (05)

OR

Write a JavaScript code block, which checks the contents entered in a form's Text element. If the text is entered in lower case, convert to upper case.

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B.Tech (CSE/IT)

END SEMESTER EXAMINATION**EVEN SEMESTER (IV), 2021-22****ECS 254: PRINCIPLES OF PROGRAMMING LANGUAGES****Time: 2:30 Hours****Max. Marks: 50****Note:** Attempt all questions. All questions carry marks, as shown against them.**Course Outcomes (CO)**

- Understand the evolution of programming languages along with the desirable features and design issues. (Understand)
- Understand the requirement of elementary and structured data types in programming languages and analyze their features. (Understand, Analyze)
- Understand and apply the concept of various program development constructs/mechanisms such as sequence control, recursion, scope rules, co-routines, parameter passing, exception handling etc. (Understand, Apply)
- Understand the concept of storage management and language translation issues as applicable to a programming language. (Understand)
- Understand and compare features of various types of general/specific purpose programming languages and their programming environment. (Understand, Analyze)

		Related CO	Marks
Q.No. 1:	Attempt both parts		
(a)	What are the major factors that affect development and evolution of programming language?	01	05
(b)	What is binding? What are the various methods of binding? Explain.	01	05
Q. No.2:	Attempt both parts		
(a)	What are elementary data-types? How it is declared and initialized in programming language? Explain with suitable example.	02	05
(b)	Write short notes on: (I) Enumeration. (II) Abstract data-types.	02	05
Q. No. 3:	Attempt both parts:		
(a)	Describe sequence control in various statements with suitable examples.	03	05
(b)	What are the various methods of Exception handling? How to handle exception in C++?	03	05

OR

Discuss Call by Value and Call by Reference parameter passing schemes. Explain Why simple SWAP procedure to interchange values of two variables is not effective in languages using Call by Value parameter passing scheme. 03

Q. No. 4: Attempt both parts:

- (a) What is storage management? Describe the phases of storage management in 04 05

brief?

- (b) Differentiate between stack based and heap based storage management with suitable example? 04 05

OR

Discuss the stages of translation in programming languages with example.

04

Q. No. 5: Attempt both parts

- (a) Explain syntax and semantics of Lambda Calculus. Describe the need of lambda calculus in programming languages. 05 05
- (b) Compare C, C++ and LISP on the basis of various attributes. 05 05

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B.Tech (CSE/IT/ET/CE/ME/EE)
END SEMESTER EXAMINATION
EVEN SEMESTER (IV), 2021-22
ECS 260: CYBER SECURITY

Time: 2:30 Hours

Max. Marks: 50

Note: Attempt all questions. All questions carry marks, as shown against them.

Course Outcomes (CO)

- Understand information, information systems, information security, Cyber Security and Security Risk Analysis. (Understand)
- Understand and apply application security, data security, security technology, security threats from malicious software. (Understand, Apply)
- Understand the concepts of security threats to e-commerce applications such as electronic payment system, e-Cash, Credit/Debit Cards etc. (Understand)
- Understand and apply Information Security Governance & Risk Management, Security of IT Assets and Intrusion Detection Systems. (Understand, Apply)
- Understand various types of Security Policies, Cyber Ethics, IT Act, IPR and Cyber Laws in India. (Understand)

Q.No. 1: Attempt both parts:

- (a) What are the different types of information required by the different levels of management? Explain with examples. 01 05
- (b) What benefits we receive through Software Development Models? List out the phases of Secure System Development Life Cycle. 01 05

OR

Explain Information Security Governance in detail and process involved in the Risk Management? 01

Q. No.2: Attempt both parts:

- (a) What do you understand by Application Security? What challenges faced by vendors in regard of Application Security? Explain the guidelines to secure client side applications. 02 05

OR

What are the Security Threats to E-Commerce? Explain E-Cash. How is it useful in public domain? Explain Smart Card. Explain how Credit Card is different from Debit Card. 02

- (b) How you can say that Intrusion Detection is the backbone of IS? Justify along with its categories. 05

Q. No. 3: Attempt both parts:

(a) Define the following:

- (i) CCTV
- (ii) Intrusion Detection System
- (iii) Digital signature
- (iv) Backup Security Measures.
- (v) Firewall

03 05

(b) Explain Access control. What is included in authorization process for – File, Program and explain all type of control. 03 05

Q. No. 4: Attempt both parts:

(a) Describe Backup security measures. What do you mean by Disposal of Data? 04 05

(b) What is Electronic Data Interchange? What are the benefits of EDI? How can it be helpful in governance? 04 05

Q. No. 5: Attempt both parts:

(a) Write short notes on- 05

(i) Intellectual Property Issues (IPR) 2.5
(ii) Copyright Act. 2.5

(b) Explain WWW policies, Corporate Policy in Cyber Security in detail. 05 05