(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] JANUARY 2024

Paper Code: HS-301 ***Subject: Economics for Engineers***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit.

Q1 Answer the following questions briefly:-
(a) Elaborate resource constraint as an economic problem. **(3)**
(b) Justify how indifference curve helps in understanding consumer's choice. **(3)**
(c) What is oligopoly market. **(3)**
(d) Define NNP, GNP, GDP. **(3)**
(e) State the Law of Demand. **(3)**

UNIT-I

Q2 (a) List the differences between Microeconomics and Macroeconomics. **(5)**
(b) List the factors effecting demand and supply. **(5)**
(c) Explain how Production Possibility Curve helps in product choice decisions. **(5)**

Q3 (a) Explain the circular flow of income in an economy. What does it measure? **(8)**
(b) Explain the elasticity of demand and supply with example. **(7)**

UNIT-II

Q4 (a) How Cardinal and Ordinal utilityare used to analyze consumer behaviour. **(8)**
(b) What is demand forecasting? List the features demand forecasting. How it proves a useful tool for decision makers. **(7)**

Q5 (a) List different methods of demand forecasting. Explain any two quantitative methods of demand forecasting. **(8)**
(b) Explain about consumer equilibrium. **(7)**

UNIT-III

Q6 (a) Define 'Cost'. How are costs classified? Explain any two important cost concepts useful for managerial decisions. **(8)**
(b) Distinguish between monopoly and perfect competition. **(7)**

Q7 (a) Define economics of scales and diseconomies of scales. **(8)**
(b) Differentiate between perfect competition and monopolistic competition? **(7)**

UNIT-IV

Q8 (a) What are the major macroeconomic issues directly related to business decision making? **(8)**
(b) Explain different phases of business cycle? **(7)**

Q9 (a) What is inflation. Briefly explain the features and types of inflation. **(8)**
(b) Explain different approaches used in calculating national income? **(7)**

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END TERM EXAMINATION

FIFTH SEMESTER [B. TECH] JANUARY 2024

Paper Code: CIC-303 **Subject: Compiler Design**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions including Q. No. 1 which is compulsory. Select one question from each unit. Assume missing data.

Q1. Answer the following questions: (5*3=15)

a) What is Translator? Differentiate between an interpreter and a compiler in terms of functionality.

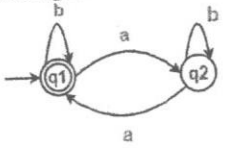
b) Define the term "parser" and its role in the context of compiler design.

c) What is left recursion? Eliminate left recursion from the following grammar:

E -> E + T | T
T -> T * F | F
F -> (E) | id

d) What is DAG? What are the advantages of DAG?

e) Consider the transition diagram



Convert the above finite automata into the regular expression.

UNIT-I

Q2. a) Define the term "compiler" and explain its role in the context of programming languages. Also explain structure and phases of a compiler in detail. (8)

b) How do we implement lexical analyzer? Explain step by step procedure for implementing lexical analyzer for the following LEX program: (7)

```
AUXILLARY DEFINITIONS:
        (none)
TRANSLATION RULES:
  a      {} /* Actions are omitted here*/
  abb    {}
  a*b+   {}
```

Q3. a) Write step by step procedure to construct the NFA for the following regular expression: (8)

R = (a | b)*abb

b) What is input buffering? How it helps in construction of compiler? Explain. (7)

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UNIT-II

Q4. a) Consider the following grammar: (5)

S -> ABC, A-> Aa | d, B-> Bb | e, C-> Cc | f

Eliminate left recursion from the above grammar.

b) Explain and remove the ambiguity from following CFG. (5)

E-> E+E | E-E | E/E | E*E | (E) | -E | id

c) Find the FIRST and FOLLOW for the following given grammar: (5)

E -> TE'
E' -> +TE' | ε
T -> FT'
T' -> *FT' | ε
F -> (E) | id

Q5. a) Test whether the grammar is LL (1) or not and construct a predictive parsing table for it. (8)

S -> iCtSS' | a
S' -> eS | ϵ
C -> b

b) Construct the LR(0) parsing table for the following grammar. (7)

S->L=R
S->R
L->*R
L->id
R->L

Check whether the above grammar is LR (0) grammar or not.

UNIT-III

Q6. a) State and explain the syntax directed translation scheme for the desk calculator and give the parse tree and translation for the string (8)

w = 20 * 7 + 3.

b) What is intermediate code representation? Explain various intermediate code representation schemes with the help of an example. (7)

Q7. a) What do you mean by three address code? Convert the following statements into the Quadruple, Triple and Indirect triple representation: (A+B)*(C-D*E) (8)

b) What is type checking? Explain rules of type checking in context of semantic analysis. (7)

UNIT-IV

Q8. a) What is the use of symbol table? Explain the any two data structures associated with symbol table in detail. (8)

b) Write short note on the following: (7)
   a) Loop unrolling & Loop jamming
   b) Code generation

Q9. a) Write short note on the following: (8)
   a) Basic blocks & flow graph
   b) Peephole optimization

b) Explain the various types of errors generated during the various phases of the compiler. How do we recover from these errors? (7)

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END TERM EXAMINATION

FIFTH SEMESTER (B.TECH) JANUARY-2024

Paper Code: CIC-307 ***Subject: Computer Networks***

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including question no.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

Q1 Attempt **(Any Five)** **(3x5=15)**

a) What is the purpose of a switch in a network?
b) Explain the difference between half-duplex and full-duplex communication.
c) Explain the purpose of a subnet mask in IP networking.
d) Define the role of a DNS server in network communication.
e) Define the term "fiber optic cable" and explain its advantages in data transmission.
f) How flow and error control works in data link layer?

UNIT-I

Q2 a) What is OSI model. Explain its layers in detail with the help of diagram. Also list the difference between OSI and TCP/IP model? **(10)**

b) An 8 bit byte binary value 10101111 is to be encoded using an even parity Hamming code. What is the binary value after encoding? **(5)**

Q3 a) Explain different types of Guided and Unguided transmission media with the help of diagram. Also list out the advantages and disadvantages of each? **(10)**

b) What is Packet Switching? Explain Virtual circuit and Datagram approach in detail? **(5)**

UNIT-II

Q4 a) What are the various design issues in Data Link Layer? Explain the Stop and Wait ARQ protocol with diagram. **(8)**

b) Compare and contrast HDLC and PPP. Explain the frame format of both with a diagram. **(7)**

Q5 a) Compare and contrast the features of repeaters, hubs, switches, and bridges. Describe the functions of each device and emphasize how each one manages traffic flow and improves network performance. **(8)**

b) Explain channel allocation problem and its solution. Provide an example to illustrate. **(7)**

UNIT-III

Q6 a) What is the difference between classful and classless IP addressing? Explain using an example. **(5)**

b) Explain the Leaky bucket algorithm and illustrate how traffic congestion can be reduced. **(5)**

c) What is the maximum number of subnets in each case? **(5)**

i) Class A; mask 255.255.192.0
ii) Class B; mask 255.255.192.0
iii) Class C; mask 255.255.255.192
iv) Class D; mask 255.255.255.240

P.T.O.

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Q7 a) What are distance-vector and link-state routing algorithms. Explain? **(5)**

b) Describe the role of ARP in computer networks. How does ARP help devices communicate within the same network? Provide a basic explanation of the ARP process. **(5)**

c) An organisation is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. **(5)**

i) Find the subnet mask.
ii) Find the number of addresses in each subnet.
iii) Find the first and last addresses in subnet 1.
iv) Find the first and last addresses in subnet 32.

UNIT-IV

Q8 a) Explain the differences between UDP and TCP in the transport layer. Discuss their main characteristics and provide examples where using UDP might be more advantageous than TCP? **(7.5)**

b) Describe the importance of congestion control in the transport layer. How does congestion control contribute to maintaining network stability and ensuring a reliable data transfer process? **(7.5)**

Q9 a) Explain the client-server model in the context of the application layer. Discuss the roles of clients and servers in this model, highlighting how communication is established between them? **(7.5)**

b) Provide an overview of the Domain Name System (DNS). How does DNS work to translate domain names into IP addresses? Explain the role of DNS servers in facilitating web browsing and internet communication? **(7.5)**

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CIC-307

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] JANUARY 2024

Paper Code: CIC-309 ***Subject: Software Engineering***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Use of simple Calculator is allowed.

Q1 Answer **any five** questions:- **(5x3=15)**

(a) Briefly explain the concept of Software Crisis and how it differs from common Software Myths. Provide real-world examples.

(b) Distinguish software re-engineering and reverse engineering?

(c) Calculate and interpret Halstead's effort for a program where the number of distinct operators is n_1=15, the number of distinct operands is n_2=20, the total number of operators isN_1=120, and the total number of operands is N_2=80.

(d) Discuss the implications of high coupling on software maintainability, with examples from industry practices.

(e) Discuss the role of regression testing in Agile methodologies.

(f) Draw the Context level 0 and level 1 DFD for the Safe home Software?

(g) Assess the effectiveness of data dictionaries in managing large-scale software projects, citing real-world applications.

(h) Develop a set of test cases to perform boundary value analysis for the following input fields in an online registration form:

(i) Age: The form requires students to enter their age, which must be between 18 and 30 years inclusive.

(ii) Number of Completed High School Subjects: The form also asks for the number of completed high school subjects, which should be a minimum of 5 and a maximum of 12.

Ensure your test cases cover the boundary conditions for these input fields.

UNIT-I

Q2 (a) Compare and contrast the Waterfall and evolutionary Models of SDLC. Focus on key stages, flexibility, risk management, and suitability for different types of projects. Provide examples. **(7.5)**

(b) Explain the importance and steps of requirement elicitation in software engineering. Discuss the FAST and Use Case approaches, highlighting their strengths and limitations. **(7.5)**

Q3 (a) Describe the key characteristics and structure of an effective Software Requirement Specification (SRS) document. Use IEEE standards as a reference. **(7.5)**

(b) Discuss the differences and similarities between Functional and Non-Functional requirements with examples. How do these impact the software development process? **(7.5)**

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UNIT-II

Q4 (a) Explain the COCOMO cost estimation model. Perform a basic COCOMO calculation for a project with a given size (50 KLOC). Using the Intermediate COCOMO model, calculate the effort in person-months. Assume the project has 'HIGH' complexity [CMPLX=High=1.15]. **(5)**

(b) Describe the concepts of cohesion and coupling in software design. Provide examples of each and discuss their impact on software maintainability and flexibility. **(5)**

(c) Write a short note on live variables and module weakness. **(5)**

Q5 (a) Discuss the Putnam Resource Allocation Model, including its application and limitations. Perform a calculation using given project parameters. **(5)**

(b) Compare and contrast Object-Oriented Design (OOD) and Function-Oriented Design (FOD) in terms of their methodology, advantages, and disadvantages. **(5)**

(c) Differentiate between Function Point and LOC software Metrics. Why Function points metrics are preferred over Lines of Code Metrics. **(5)**

UNIT-III

Q6 (a) Explain Halstead's Software Science metrics. Write equations to calculate the Effort and Time for a given program using Halstead's methos. **(7.5)**

(b) Describe the concept of Software Reliability. Compare the Basic Model and Logarithmic Poisson Model in terms of their approach and applicability. **(7.5)**

Q7 (a) Discuss the importance of software metrics in software engineering. Explain Token Count and Information Flow metrics with examples. **(7.5)**

(b) Explain the CMM (Capability Maturity Model) and ISO 9001 standards. Discuss how they contribute to software quality assurance. Give example of three CMM Level 3 companies based in India. **(7.5)**

UNIT-IV

Q8 (a) Describe the testing process in software engineering, focusing on the importance of functional and structural testing. Provide examples of test cases for each. **(5)**

(b) Create Control Flow Graph for a module that checks if sum of 2 numbers is positive, negative or neutral. Also find cyclomatic complexity number for this module and number of independent paths in the module. **(5)**

(c) Explain the concept and process of Software Maintenance. Discuss the Quick-fix and Boehm's models of maintenance with their merits and demerits. **(5)**

Q9 (a) Define and differentiate between Verification and Validation in software testing. Provide examples to illustrate your points. **(5)**

(b) Discuss the importance and methods of Software Configuration Management in the context of software maintenance. **(5)**

(c) Explain the importance of acceptance testing in software development. Compare and contrast alpha and beta testing. **(5)**

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END TERM EXAMINATION

FIFTH SEMESTER (B.TECH) JANUARY-2024

Paper Code: CIC-311 **Subject: Design Analysis & Algorithm**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions including Q. no.1 which is compulsory. Select one question from each unit.

(3×5=15)

Q1 Attempt **Any five** questions:

a. What is an Algorithm and also discussed the characteristics of algorithm.

b. Define big oh(O),Big omega(Ω) and big theta(Θ) notations

c. What is the use of Warshall's algorithm and Floyd's Algorithm?

d. What are NP Hard and NP Complete problems?

e. Explain local search heuristic with example

f Explain optimal binary search tree Problem with example

g Apply the Quick sort to the list E , X , A , M , P , L , E

UNIT I

Q2 a. What do you mean by complexity of an algorithm? Explain the notations used to denote the complexity of an algorithm. **(7)**

b. Explain the following with example: **(8)**

(i) Selection sort.

(ii) Disjoint Sets.

Q3 a. How the operations performed in Strassen's Matrix multiplication **(7)**

b Explain in detail merge sort. Illustrate the algorithm with a numeric example. Provide complete analysis of the same. **(8)**

UNIT II

Q4 a Explain Prim's algorithm for minimal spanning tree with an example. **(7)**

b Write in detail about Hamiltonian cycles. Give example to it. **(8)**

Q5 a Write backtracking algorithm for **(7)**

I. The n-queens problem
II. Hamiltonian problem
III. The subset-Sum problem

b Define Greedy knapsack. Find the optimal solution of the Knapsack instance n= 7, M=20, (p1, p2, ...p7) = (8,5,6,7,6,12,3) and (w1,w2,....w7)=(2,10,8,7,6,4,11) **(8)**

UNIT-III

Q6 a Explain the Travelling salesmen problem using Branch and bound technique.. **(7)**

b What is backtracking? Solve 8 queens problem with backtracking. **(8)**

Q7 a What do you mean by dynamic Programming? Explain O/I knapsack problem by using dynamic programming. **(7)**

b Explain the chained matrix multiplication with suitable example **(8)**

P.T.O.

UNIT-IV

Q8 a Explain the following **(7)**

(a) NP hard Graph.
(b) NP scheduling problems

b What are NP Hard and NP Complete problems? Explain Cook's theorem **(8)**

Q9 a Explain non-deterministic algorithm with an example. **(7)**

b What is state space tree? What are the different ways of searching an answer node in an state space tree explain with example. **(8)**

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] FEBRUARY 2023

Paper Code: ETCS301 ***Subject: Algorithms Design and Analysis***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions in all including Q.No.1 which is compulsory.

Q1 Attempt all questions: **(5x5=25)**

a) Define time complexity and space complexity. Write an algorithm for adding n natural numbers and find the space required by that algorithm.

b) Define Big 'Oh' notation. Formulate the order of growth. Compare the order of growth n! and 2n.Differentiate between Best, average and worst case efficiency.

c) Differentiate divide and conquer and dynamic programming.

d) Explain dynamic programming method of problem solving. What type of problems can be solved by dynamic programming?

e) Determine an LCS of <1, 0, 0, 1, 0, 1, 0, 1> and <0, 1, 0, 1, 1, 0, 1, 1, 0>

Q2 **(4+4+4.5)**

a) Discuss the concepts of asymptotic notations and its properties.

b) Analyze the order of growth.
F(n) = 2n2 + 5 and g(n) = 7n. Use the Ω (g(n)) notation.

c) Evaluate the recurrence relations.
(i). x (n) = x (n-1) + 5 for n>1.
(ii). X (n) = x(n/3) +1 for n >1,x(1) =1. (Solve for n = 3k)

Q3 **(4+4+4.5)**

a) Which sorting algorithm is best if the list is already sorted? Why?

b) Prove that the average running time of Quick Sort is O(nlog(n)) where n is the number of elements.

c) What are stable algorithms? Which sorting algorithm is stable? Give one example and explain.

Q4 **(4+4+4.5)**

a) Implement UNION using linked list representation of disjoint sets.

b) Explain the characteristics of problems that can be solved using dynamic programming.

c) Give a control abstraction for Divide and Conquer method. Explain with an example.

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Q5 **(4+4+4.5)**

a) Explain the effect of negative weight edges and negative weight cycles on shortest paths.

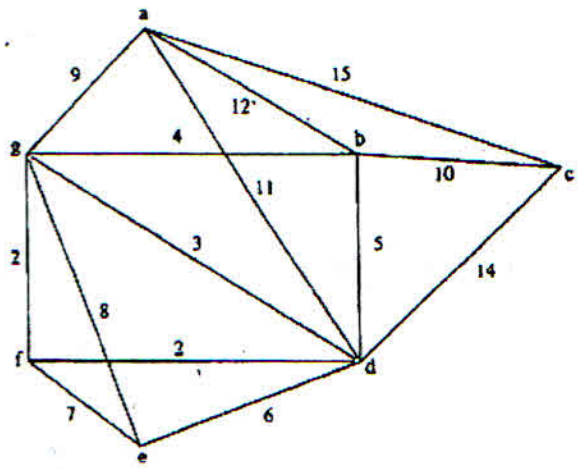
b) Define strongly connected components. How DFS can be used to find strongly connected components?

c) Find an optimal paranthesization of a matrix-chain product whose sequence of dimensions is 4x10, 10x3, 3x12, 12x20

Q6 **(6+6.5)**

a) Write Dijkstra's Single Source Shortest path algorithm. Analyze the complexity.

b) Find minimum spanning tree for the following graph using Prims algorithm and discuss complexity.



Q7 **(6+6.5)**

a) Explain Rabin-karp string matching algorithm in brief.

b) Find longest common subsequence of following two strings X and Y using any algorithm :
X = 'aabdbacdcba'
Y = 'aabddcbac'

Q8 **(4+4+4.5)**

a) Differentiate between P, NP, NP-completeness and NP – Hard problems.

b) How a problem is identified as NP complete problem? Give atleast five problems that can be classified as NP complete problems.

c) With examples explain polynomial time reducibility.

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(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] FEBRUARY 2023

Paper Code: ETCS303 ***Subject: Software Engineering***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt five questions including Q.No.1 which is compulsory. Assume missing data. Select one question from each unit.

Q1 Attempt all questions: **(2.5x10=25)**

a) Distinguish between failure and faults.
b) Compare functional & behavioral analysis models.
c) Write characteristics of software as a product.
d) Write short note on Spiral Model with its merits & demerits.
e) What are the different activities during software project planning?
f) Define Data flow diagram & Data Dictionary.
g) What are responsibilities and challenges of software engineers?
h) Identify in which phase of the software life cycle the following documents are delivered.
   i) Architectural design
   ii) Test plan
   iii) Cost estimate
   iv) Source code document
i) Differentiate between object oriented design and function oriented design.
j) List the principles of a software design.

UNIT-I

Q2 a) Which is more important-the product or process? Justify your answer **(6.5)**

b) Discuss Information flow Metrics. **(6)**

Q3 a) Explain Water fall Model. What are the problems that are sometimes encountered when the waterfall model is applied? **(6)**

b) Discuss the classification of Software Metrics. **(6.5)**

UNIT-II

Q4 a) Create ER diagram & DFD for Library Management Systems. Make assumptions & clearly state them. **(6.5)**

b) What are the risk management activities? Give top five risks in case of software development. **(6)**

P.T.O.

ETCS-303
P 1/2

Q5 a) Draw an ER and DFD diagram for university information System. **(6.5)**

b) Differentiate functional and non functional requirements and explain. **(6)**

UNIT-III

Q6 a) Discuss the concept of cohesion and coupling. State the difference. **(6.5)**

b) How do you define Reliability? Discuss various models for reliability allocation. **(6)**

Q7 a) Discuss Object Oriented Design in detail. **(6.5)**

b) Explain in detail about the characteristics and criteria for a good design. **(6)**

UNIT-IV

Q8 a) What is software maintainability? How do you measure maintainability? **(6.5)**

b) Explain Reverse Engineering and Re-engineering. **(6)**

Q9 a) What is the necessity of unit testing? Write down all unit test considerations. **(6.5)**

b) Write a note of (i) Black box testing (ii) Integration testing (iii) Decision table testing **(6)**

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