# END TERM EXAMINATION

### FIFTH SEMESTER [B.TECH] DECEMBER 2024

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|---|---|
| **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.**

**Q1** Answer **any five** questions: **(5x5=25)**

a) What is the circular flow of economic activity, and why is it a fundamental concept in economics?

b) Define utility in economics. How does it relate to consumer satisfaction and preferences?

c) Explain the difference between short-run and long-run costs. Discuss how a firm's costs change in the short run and long run, especially concerning variable and fixed costs.

d) Define national income accounting. Why is it important for measuring the economic performance of a country?

e) Define monetary policy. What are the primary objectives of monetary policy in an economy?

f) Differentiate between Micro and Macro Economics.

**Q2** Explain the concepts of elastic, inelastic and unitary price elasticity of demand. Explain with diagram. **(12.5)**

**Q3** Describe the law of diminishing marginal utility. How does it influence consumer behavior and purchasing decisions? Provide real-life examples illustrating the law of diminishing marginal utility. **(12.5)**

**Q4** Explain the characteristics of perfect competition, monopoly, monopolistic competition, and oligopoly in the market. Provide real-world examples of each. **(12.5)**

**Q5** Ilustrate the concept of opportunity cost? What does it represent in terms of economic choices? **(12.5)**

**Q6** Explain different techniques for demand forecasting like Exponential Method, Time-Series Method and Moving Averages Method. **(12.5)**

**Q7** How do international events, trade policies, and global economic conditions influence the demand for goods and services in a country? **(12.5)**

**Q8** Define indifference curve and explain its properties. Illustrate with a diagram. **(12.5)**

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# END TERM EXAMINATION

### FIFTH SEMESTER [B.TECH] DECEMBER 2024

| | |
|---|---|
| Paper Code: CIC-303 | Subject: Compiler Design |
| Time: 3 Hours | Maximum Marks: 75 |

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

**[5x5=25]**

**Q1**   Attempt **any Five** in all

a) What factors lead to ambiguity in a CFG? Discuss using suitable example.

b) A left recursive grammar cannot be LL(1). Justify.

c) Explain Input Buffering approach used in design of Lexical Analyzers.

d) What are inherited and synthesized attributes? Give examples.

e) What is a operator grammar? Check whether the grammar with production E→a/ε is a operator grammar or not.

f) Define handle pruning by taking suitable example.

## UNIT-I

**Q2**  a) What is a compiler? Explain various phases of a compilation process in detail. **[6.5]**

b) What is a cross compiler? Discuss its importance. **[3]**

c) Do NFA and its equivalent DFA have same power in terms of acceptance? Justify your answer using suitable example. **[3]**

**Q3**  a) Explain in detail LEX and YACC. **[6.5]**

b) Explain Input Buffering approach used in design of lexical Analyzers. **[3]**

c) Explain token, pattern and lexeme taking suitable examples. **[3]**

## UNIT-II

**Q4**  a) Give Check whether the following grammar is LL(1), LR(0), SLR(1) or not: S→A/a   A→a **[5]**

b) Eliminate Left Recursion in the following grammar: S→Aa/b A→Ac/Sd/ε Order of non-terminals: A, S **[3]**

c) A left recursive grammar cannot be LL(1). Justify taking suitable example. **[2.5]**

d) Compute the First and Follow for each of the non-terminals in the following grammar: S→aBCd/dCBeB→Bb/εC→ca/ac/ε **[2]**

**Q5**  a) Explain shift-reduce and reduce-reduce conflicts in LR(0), SLR(1), CLR(1) and LALR(1) taking suitable examples. **[6.5]**

b) What factors lead to ambiguity in a CFG? Discuss using suitable example. **[3]**

c) Left factor the given grammar: E→E+T/ET→int/(E) **[3]**

# END TERM EXAMINATION

### FIFTH SEMESTER [B.TECH] DECEMBER-2024

**Paper Code: CIC-305**                                   **Subject: Operating Systems**

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

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

**Q1**   (Attempt any Five)                                                     (5x5=25)
- (a) Explain the statement: OS – A Resource Manager.
- (b) What is Convoy effect? How it will improve the performance of a system.
- (c) What is the meaning of the term *busy waiting*? Can busy waiting be avoided altogether?
- (d) Why are pages sizes always power of 2? Explain.
- (e) Is it possible to have a deadlock involving only one single process? Explain your answer.
- (f) What do you understand by file? Write various attributes of a file.

## UNIT-I

**Q2**   (a) Differentiate between Process and Thread. Also, explain various thread states.   (4)
- (b) Define the difference between preemptive and nonpreemptive scheduling. State why strict nonpreemptive scheduling is unlikely to be used in a computer.   (3.5)
- (c) Differentiate between Multiprogramming, Multiprocessing and Multitasking Operating system.   (5)

### OR

**Q3**   (a) Consider the following set of processes, with the CPU-burst time given in milliseconds:   (6.5)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| A | 0 | 12 |
| B | 3 | 8 |
| C | 5 | 5 |
| D | 7 | 1 |
| E | 9 | 11 |

Draw the Gantt charts illustrating the execution of these processes & find:
- (i) Average waiting time for these processes with the SJF, Shortest Remaining Time First, Round Robin (Time quantum = 3ms) & FCFS scheduling algorithm.
- (ii) Average turn around time for these processes with the SJF, SRTF, Round Robin & FCFS Algo.
- (b) Draw Queueing-diagram representation of process scheduling. Differentiate between Short Term Scheduler, Medium Term Scheduler and Long Term Scheduler.   (6)

## UNIT-II

**Q4**   (a) Explain bakery algorithm. Prove that it satisfy all the three requirements for critical section problem.   (5)
- (b) What is race condition? Illustrate it with an example.   (2)
- (c) Define Semaphores. What are various types of semaphores? How they are different from critical regions?   (5.5)

**P.T.O.**

**OR**

Q5 (a) Consider there are 3 frames allocated to a process and the page reference string is: (6.5)
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
How many page faults would occur for the FIFO, LRU and OPTIMAL page replacement algorithms?

(b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. (3)
(i) How many bits are there in the logical address?
(ii) How many bits are there in physical address?

(c) Describe the role of TLB in address translation with the help of a suitable diagram. (3)

## UNIT-III

Q6 (a) What is Safe state? Explain with the help of suitable example. (3)
(b) Explain Bankar's Algorithm including safety algorithm & resource request algorithm (3)
(c) Consider the following snapshot of a system- (6.5)

| Process | Allocation | | | | Maximum | | | |
|---------|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D |
| P1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 |
| P2 | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 |
| P3 | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 |
| P4 | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 |
| P5 | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 |

Let the available number of resources be given by avail vector as (1, 5, 2, 0). Answer the following questions using the banker's algorithm:
(i) Find the contents of the matrix "NEED".
(ii) Is the system in a safe state? If it is in safe state, identify the safe sequence.
(iii) If a request from process P1 for (0, 4, 2, 0) arrives, can it be granted immediately?

**OR**

Q7 (a) A disk with 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO Order, is (6.5)

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
(i) FCFS (ii) SSTF (iii) SCAN (iv) C-SCAN (v) LOOK (vi) C-LOOK

(b) Explain Resource allocation graph. (3)
(c) What are the four conditions that must be present for a deadlock to be possible? (3)

## UNIT-IV

Q8 Explain the following: -
(a) Difference between logical and physical file system.
(b) Ext2 and Ext3 file system. (4)
(c) Differentiate between FAT and NTFS. (4)
                                                                        (4.5)

Q9 (a) Describe various file allocation methods. Compare Indexed allocation with contiguous file allocation scheme.

**OR**

(b) Describe file access control mechanism. (4)
(c) Explain file access methods in Operating system. (4)
                                                                        (4.5)

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CIC-305

# END TERM EXAMINATION

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

Time: 3 Hours

**Maximum Marks: 75**

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

Q1    Attempt **any five** questions from the following:     (5x5=25)
- a) Differentiate between TCP and UDP.
- b) What are major advantages of STP over UTP?
- c) What are different access methods in broadband ISDN?
- d) What is the relationship between SONET and SDH?
- e) In electronic mail, what is MIME?
- f) What is proxy server and how it is related to HTTP?
- g) What is network security? Explain the principles of network security.

## UNIT-I

Q2  a) What is data communication? What are its four fundamental characteristics? With a neat diagram, explain the components of data communication system.     (6.5)

  b) Compute the CRC for a 10 – bit sequence 1010011110 and a divisor of 1010.     (6)

Q3  a) What is a peer to peer process? What are heades and trailers and how do they get added and removed?     (6.5)

  b) What is a network adapter? Explain with a block diagram.     (6)

## UNIT-II

Q4  a) Define stop and wait ARQ protocol Explain the reason for moving from stop and wait ARQ protocol to the GO-BACK-N ARQ protocol.     (6.5)

  b) What are some of the factors that determine whether a communication system is LAN, MAN or WAN?     (6)

Q5  a) Differentiate between ALOHA and slotted ALOHA.     (6)

  b) Explain the different causes of transmission impairments during signal transmission through media.     (6.5)

## UNIT-III

Q6  a) What is the need to change from IPV4 to IPV6? Write IPV6 basic header and describe its field.     (6.5)

  b) Explain the PIM protocol with a suitable example.     (6)

Q7  a) Name different types of HDLC frames and give a brief description of each.     (6)

  b) Evaluate maximum bit rate for channel having bandwidth 3100 Hz and S/N ratio of 20dB.     (6.5)

## UNIT-IV

Q8  a) Explain the "slow start" mechanism used by TCP to avoid congestion in the network.     (6.5)

**P.T.O.**

[ - ]

b) Why transport layer protocols like TCP and UDP are called end to end protocols. What is the difference between them? **(6)**

Q9 • a) Explain the ethernet with special reference to frame format. **(6)**

b) Explain the network layer in internet and the network layer in ATM in detail. **(6.5)**

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# END TERM EXAMINATION

### FIFTH SEMESTER [B.TECH] DECEMBER-2024

Paper Code: CIC-309       Subject: Software Engineering

Time: 3 Hours

Maximum Marks: 75

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

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

(a) List out any three software processes and product metrics with the help of examples.

(b) Define SRS and its characteristics.

(c) List the advantages and disadvantages of using LOC as a metric.

(d) What is Mutation Testing?

(e) What are the potential solutions to Software maintenance problems?

(f) Distinguish between failure and Faults.

(g) List the Software Quality Factors.

(h) Explain black box testing.

(i) Compare Reverse engineering with software reengineering.

(j) What is cyclomatic complexity?

## UNIT-I

(a) Write Short Note on          (6.5)
     (i)     Data Flow Diagram
     (ii)    Data Dictionary

(b) Explain the Incremental Development model with a neat diagram. List its benefits and problems.      (6)

(a) List out requirement elicitation techniques. Which one is most popular and why?      (6.5)

(b) In the waterfall life cycle model, a working version of the system is not seen until late in the project's life cycle. Suggest another life cycle model to solve the problem and give its working.      (6)

## UNIT-II

(a) Explain the various software risks and their management methods. Is it possible to prioritize risks?      (6.5)

(b) Define the concept of cohesion and coupling. State the difference and explain why "low coupling and high cohesion" is desirable for good software design?      (6)

**P.T.O.**

**Q5** (a) Explain any two software size estimation techniques. Compute the function point value for a project with the following information domain characteristics. **(6.5)**

Number of user inputs=30
Number of user outputs=42
Number of user enquiries=08
Number of files=07
Number of user inputs=30
Assume that all complexity adjustment values are moderate.

(b) Explain the various design concepts considered during the software design process. Discuss Object-oriented design in detail. **(6)**

## UNIT-III

**Q6** (a) Define Software metrics. Why do we need metrics in software? Explain Halstead software science measures and calculate vocabulary, length and volume for below code. **(6.5)**

```
main()
{
int x, y, z;
scanf("%d %d %d", &x, &y, &z);
prod=(x*y*z);
prinf("Product of three numbers is: %d", prod);
}
```

(b) Define Reliability. Discuss various models of reliability. **(6)**

**Q7** (a) Explain information flow metrics. **(6.5)**

(b) What is Capability Maturity Model (CMM)? Explain the various levels of the Capability Maturity Model. **(6)**

## UNIT-IV

**Q8** (a) What are the levels of testing in Software Engineering? Explain in detail. **(6.5)**

(b) What is software maintainability? How do you measure maintainability? **(6)**

**Q9** (a) Write a short note on **(6.5)**
(i) Equivalence Class testing and Decision Table testing with example.
(ii) Debugging techniques
(b) Differentiate between Development testing and Regression Testing. **(6)**

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# END TERM EXAMINATION

### FIFTH SEMESTER [B.TECH] DECEMBER 2024

| Paper Code: CIC-311 | Subject: Design and Analysis of Algorithm |
|---|---|
| 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    Attempt all questions:-                                        (5x5=25)
(a) Define Theta and Omega notations.
(b) Compare the worst case and best case complexities of the following: Insertion sort, Merge sort and Quick Sort
(c) Explain why Dijkstra's Algorithm doesn't work for Negative weight Edges.
(d) Differentiate between dynamic programming, divide and conquer approach and Greedy approach.
(e) What are union find problems?

## UNIT-I

Q2    (a) **Solve the following recurrence relations:**                    (6.5)
   (i)    $T(n) = 3T(n/4) + n^2$ using Iterative method
   (ii)   $T(n) = 3T(n/4) + (n \log n)$ using Master method
   (iii)  $T(n) = 2T[(n/2)+16]+n$ using substitution method
(b) Analyse the Merge Sort Algorithm and then find the recurrence in case of worst case running time.                                        (6)

Q3    (a) Explain Quicksort algorithm and explain best case time complexity of the algorithm.                                                         (6.5)
(b) Explain Strassen matrix multiplication with example.              (6)

## UNIT-II

Q4    (a) Explain Hamiltonian cycle problem with a suitable example.       (6.5)
(b) Find the minimum spanning tree of the following:                  (6)



P.T.O.
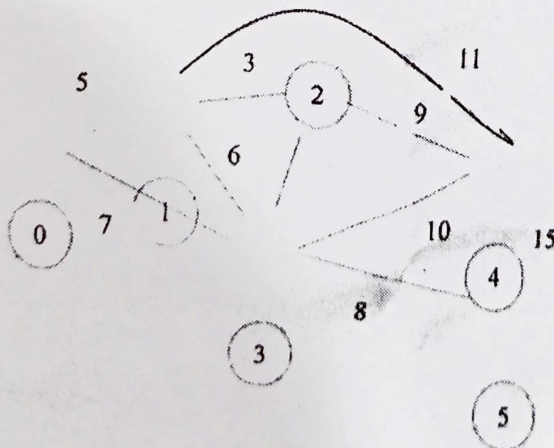
5    (a) What is Huffman algorithm. Explain it with an example and how it follows greedy approach.
     (b) Differentiate between Prim's and Kruskal Algorithm.                    (6.5)
                                                                                 (6)

## UNIT-III

Q6   (a) What are the ingredients of dynamic programming? Explain how dynamic programming is different from divide and conquer approach.
                                                                                 (5)
     (b) Find the optimal parenthesization of a matrix chain product whose sequence of dimensions are <2,3,4,5,6>.
                                                                                 (7.5)

Q7   (a) Find the LCS of the following S1= { B,C,D,A,A,C,D} , S2 ={ A,C,D,B,A,C}.
                                                                                 (6.5)
     (b) Explain the Travelling salesperson problem using branch and bound approach.
                                                                                 (6)

## UNIT-IV

Q8   (a) Compute the number of spurious hits in Rabin-Karp matcher for working Modulo q=11, T= G A T A A G A C A C, when looking for the pattern P=G A C A.
                                                                                 (4.5)
     (b) Define the complexity classes: P, NP, NPC.                             (4)
     (c) Explain Ford –Fulkerson method to find maximum flow in a network.
                                                                                 (4)

Q9   (a) Explain prefix function used in Knuth Morris Pratt algorithm using suitable example.
                                                                                 (4.5)
     (b) What are NP- Hard and NP-Complete classes.                             (4)
     (c) What is maximum bipartite matching. Explain with an example.     (4)

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