DS/ML

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2024

Paper Code: AIDS/AIML-301	Subject: Operating Systems
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 all the questions   (2.5x10=25)
- a) What is a real-time operating system?
- b) What is busy waiting. How busy waiting can be avoided?
- c) What is Directory and inodetable.
- d) Difference between semaphore and Monitor.
- e) Write down the various types of system calls provided by an operating system.
- f) Difference between page and segment.
- g) Explain the concept of Context switching.
- h) What do you mean by Demand Paging?
- i) When does thrashing occur?
- j) What is the role of thread?

UNIT-I

Q2   a)   What is a process? Explain about various fields of Process Control Block.   (2.5)
     b)   Explain the major function of the Operating system.   (4)
     c)   Draw and explain the process state transition diagram.   (6)

OR

Q3   a)   Explain the term starvation. What criteria affect the scheduler performance? What are the different principles that must be considered while selecting scheduling?   (6.5)
     b)   What is the difference between preemptive and non-preemptive scheduling? Discuss the Multilevel Feedback Queue Scheduling Algorithm.   (6)

UNIT-II

Q4   a)   What do you understand by the critical section? Write and explain Peterson's solution to the critical section problem.   (6.5)
     b)   What do you understand by race condition? Give few examples of the arising of race conditions in the concurrent process.   (6)

OR

Q5   a)   Describe the Bankers algorithm for safe allocation.   (4)
     b)   Considering a system with five processes P0 through P4 and three resources of type A, B, and C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose the following snapshot of the system has been taken.   (6)

Process	Allocation A B C	Max A B C	Available A B C
P0	0 1 0	7 5 3	3 3 2
P1	2 0 0	3 2 2	
P2	3 0 2	9 0 2	
P3	2 1 1	2 2 2	
P4	0 0 2	4 3 3	

P.T.O.

1. What will be the content of the Need matrix?
2. Is the system in a safe state? If Yes, then what is the safe sequence?

c)   List the necessary conditions for the deadlocks. **(2.5)**

UNIT-III

Q6   a)   Explain the difference between internal and external fragmentation with neat diagram. **(6)**

b)   What do you understand by Page replacement? How many Page faults occur for optimal Page replacement algorithm with the following reference string for four-page frames: 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. **(6.5)**

OR

Q7   a)   What is belady's anomaly? Which algorithm suffers from belady's anomaly? **(3.5)**

b)   Consider a logical address space of eight pages of 1024 words, each mapped onto a physical memory of 32 frames then
    i.   How many bits are in the logical address?
    ii.   How many bits are in the physical address? **(5)**

c)   Write the difference between paging and Segmentation. **(4)**

UNIT-IV

Q8   a)   Suppose the moving head disk with 200 tracks is currently serving a request for track 143 and has just finished a request for track 125. If the queue of requests is kept in FIFO Order 86,147, 91,177,94,150. What is the total head movement for the following scheduling-? **(6.5)**
    i.   FCFS
    ii.   SSTF

b)   Explain various file access methods with suitable examples. **(6)**

OR

Q9   a)   Suppose, a disk has 5000 cylinders, numbered 0 to 4999. The drive is currently sending a request at cylinder 143 and the previous was a cylinder 125. The queue of pending requests in the FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, and 130. Starting from the current head position, what is the total distance (in cylinders) that the Disk arm moves to satisfy all pending requests, for each of the following disk Scheduling algorithms? **(6.5)**
    1. FCFS
    2. SSTF

b)   What is a Directory? Define any two ways to implement the directory. **(6)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2024

Paper Code: AIDS/AIML/IOT-303	Subject: Design and Analysis of Algorithms
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 the following question: **(5x5=25)**
- a) Differentiate between Prim's Algorithm and Kruskal's Algorithm.
- b) Explain application of BFS and DFS.
- c) Illustrate the steps involved in analyzing algorithm using an example.
- d) Explain the effect of negative weight edge and negative weight cycles on shortest paths.
- e) Differentiate between Dynamic and Greedy methodology.

UNIT-I

Q2   a) Explain various asymptotic notations used to represent the rate of running time of algorithms.   **(4)**

   b) Solve the following recurrence relations using Master's theorem: **(4.5)**

   i) $T(n)=2T(n/4)+\sqrt{n}$
   ii) $T(n) = 2^n T(n/2) + n^n$

   c) What are stable algorithms? Which sorting algorithm is stable? Explain using an example.   **(4)**

Q3   a) Analyze the complexity of the following functions   **(4.5)**
   i)   function(int n)
   {   if (n==1) return;
   for (inti=1; i<=n; i++)
   { for (int j=1; j<=n; j++)
   { printf("*");
   break; }
   }
   }
   ii)   void function(int n)
   { inti = 1, s =1;
   while (s <= n)
   {i++;
                   s += i;
   printf("*");
   }
   }

   b) State Master's Theorem.   **(4)**
   c) Define time complexity and space complexity. Write an algorithm for binary search and explain its complexity with respect to space and time.   **(4)**

P.T.O.

UNIT-II

Q4 a) Find the optimal solution for the following Knapsack problem. Given number of items (n)= 4, capacity of sack(m)=60, W={40, 10, 20, 24} and P={280, 100, 120, 120}. **(6.5)**

b) Explain a sorting algorithm that use divide and conquer method. **(6)**

Q5 a) Write an algorithm for Quick sort and calculate its complexity in worst, average and best case? **(6.5)**

b) Explain Strassen's matrix multiplication and analyze its complexity. **(6)**

UNIT-III

Q6 a) Find the longest common subsequence of the following two strings M and N: **(6.5)**

M = 'aabdbacdcba'

N = 'aabddcbac'

b) Solve Travelling Salesman Problem using Branch and Bound Algorithm in the following graph- **(6)**
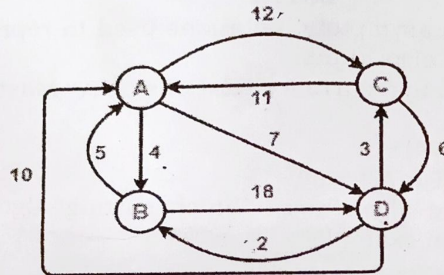
Q7 a) Explain the Floyd-Warshall algorithm and its complexity with example. **(6.5)**

b) What is Backtracking? Explain the technique by solving n-Queen problem in detail. **(6)**

UNIT-IV

Q8 a) What is reducibility? Explain with example. **(4)**

b) Define Cook's Theorem and explain its significance? **(4)**

c) Differentiate between P, NP, NP-completeness and NP-Hard problems. **(4.5)**

Q9 a) Explain Water jug problem using BFS. Let us consider two jugs a 4-gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug? **(8)**

b) Define Hamiltonian Cycle in NP. **(4.5)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER-2024

Paper Code: AIML-305	Subject: Fundamentals of Deep Learning
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
(a) What is the vanishing gradient problem, and how do activation functions address it? **(5)**
(b) Explain Shallow Learning. **(5)**
(c) Draw and discuss a multilayer neural architecture. **(5)**
(d) What is the significance of activation functions in neural networks. **(5)**
(e) Explain the role of Pooling Layers in CNNs. **(5)**

UNIT-I

Q2
(a) Explain the difference between Deep Learning and Shallow Learning. Why there is a shift from shallow learning to Deep Learning. **(6.5)**
(b) Define a loss function in the context of Deep Learning. Classify and discuss their types. **(6)**

OR

Q3
(a) Define Deep Learning and briefly explain its significance. Discuss Bayesian Learning with suitable example. **(6)**
(b) Discuss the role of gradient descent in optimizing neural network models. Explain the concept of batch optimization. Write step by step procedure to apply it. **(6.5)**

UNIT-II

Q4
(a) Describe the structure of a biological neuron and its relevance to artificial neural networks. **(6.5)**
(b) Discuss Single Layer Neural Networks and Multilayer Perceptrons. Explain the Back Propagation algorithm. **(6)**

OR

Q5
(a) Explain the idea of computational units and introduce the McCulloch–Pitts unit. Also provide differences between McCulloch & Pitt's Model and Perceptron Model. Draw OR function. **(6)**
(b) Elaborate architectural design issues in neural network models and provide two resolutions. **(6.5)**

UNIT-III

Q6
(a) Discuss the role of activation functions and techniques for evaluating, improving, and tuning artificial neural networks (ANNs). What are some common activation functions used in deep learning? Why is ReLU a popular choice as an activation function? **(6.5)**
(b) How does an RNN differ from a traditional feed forward neural network? What is the concept of hidden states in an RNN? **(6)**

OR

Q7 (a) What are Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRUs)? **(6)**

(b) Explain the challenges in training deep neural networks. Elaborate Overfitting and Hyperparameter Tuning. **(6.5)**

UNIT-IV

Q8 (a) Define Convolutional Neural Networks (CNNs) and discuss their building blocks. **(6)**

(b) Explain the architecture and functioning of VGG-16, including key elements. Highlight both the advantages, and the drawbacks, associated with VGG-16. **(6.5)**

OR

Q9 (a) Explain the concept of Transfer Learning in Convolutional Neural Networks (CNNs). Discuss how pre-trained models can be utilized for tasks with limited data. **(6)**

(b) Provide a detailed explanation of LeNET-5, its architecture and working principles. Discuss its advantages and limitations. **(6.5)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2024

Paper Code: AIDS-307	Subject: Computer Organization & Architecture
AIML-307	
IOT-307	

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:
a) Explain timing and control diagram with example. **(4)**
b) Explain RISC pipeline. **(4)**
c) What are computer registers? How information is transfer from one register to another? **(4)**
d) Differentiate between multiprocessors and multicomputer. **(4)**
e) What is grain size and latency in computer architecture? **(4)**
f) Subtract 24 from 15 using 2's compliment. **(5)**

UNIT-I

Q2 a) Explain Instruction Cycle with phases in detail with diagram. **(6)**
b) Explain the various levels of programming languages. **(6.5)**

Q3 a) Explain bus architecture using multiplexer. **(6)**
b) Explain various micro-operations. **(6.5)**

UNIT-II

Q4 Write short notes on following:
a) Instruction format. **(6)**
b) Addressing modes. **(6.5)**

Q5 a) Explain with diagram, the memory hierarchy in a computer system. **(6)**
b) Explain Set associative cache mapping in detail. (6.5)

UNIT-III

Q6 a) Differentiate between program partitioning and scheduling. **(6)**
b) How parallel processing enhances the system performance, explain. **(6.5)**

Q7 a) What are the conditions of parallelism in computer architecture? **(6)**
b) What is the classification of parallel computers? **(6.5)**

UNIT–IV

Q8 a) Explain the Flynn's classification of computer. **(6)**
b) Explain Instruction Cycle with phases in detail with diagram. **(6.5)**

Q9 a) Explain the hardware implementation of division arithmetic operation. **(6)**
b) Explain CPU performance and its factors. **(6.5)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER-2024

Paper Code: AIDS/AIML-309	Subject: Introduction to Internet of Things
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: (5x5=25)
- (a)   Define Internet of Things.
- (b)   What is NodeMCU and what are its advantage?
- (c)   What is an Arduino code called? What are the two major sections of an Arduino code?
- (d)   Explain IPv4 and IPv6.
- (e)   What are the 5 V's of Big Data?

UNIT-I

Q2   (a)   Describe the IoT enabling Technologies & M2M Communication with suitable explanations.   (6)
-     (b)   Explain the main components of the IoT architecture with diagram.   (6.5)

OR

Q3   (a)   Describe different IoT communication models in detail.   (6)
-     (b)   Define sensors and actuators. Explain how they interact with physical world.   (6.5)

UNIT-II

Q4   (a)   Explain programming the Arduino for IoT. Write the sketch for blinking LED with delay 5 sec.   (6)
-     (b)   What are the advantages in using Arduino over other microcontroller platforms? Which microcontroller is used in Arduino Uno?   (6.5)

OR

Q5   (a)   Write a program to turn on built in LED of the Arduino Uno for 1 sec and off for 1 sec. Write down the pin diagram of the sensor LM 35.   (6)
-     (b)   How many digital input/output pins and analog input pins are there in Arduino Uno? Explain the delay() and pinMode() function.   (6.5)

UNIT-III

Q6   (a)   Describe in detail with suitable example- CoAP and MQTT protocols used in application Layer.   (6.5)
-     (b)   Discuss IP addressing in IoT and how constrained nodes deal with bigger headers.   (6)

OR

Q7   (a)   Describe Physical and MAC layers topology and security of IEEE 802.15.4 & tabulate the protocol stacks utilizing IEEE 802.15.4.   (6.5)
-     (b)   Explain the following: a) 6LoWPAN b) ZigBee c) Routing Techniques.   (6)

UNIT-IV

Q8   (a)   Explain four cloud deployment models? How is cloud used as a database in IoT applications?   (6.5)
-     (b)   Explain the smart home automation system in an IoT with example.   (6)

OR

Q9   (a)   Explain the role of Big Data and data analytics in IoT.   (6.5)
-     (b)   Describe the application of Securities and industrial automation in an IoT with example.   (6)

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2024

Paper Code: AIML/AIDS/IOT-311   Subject: Principles of Entrepreneurship Mindset

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. Assume missing data if any.

Q1   Answer the following questions:-   (5x5=25)
- (a) 'Entrepreneurs are the backbone of a country' – Explain.
- (b) Why most of the entrepreneurship ventures fail?
- (c) State the reasons behind the popularity of Business Model Canvas among business community.
- (d) Write short note on Customer Acquisition Cost (CAC)
- (e) List down different survey methods to understand the customer.

UNIT-I

Q2   (a) What drives an entrepreneur?   (2)
   (b) Write the characteristics of an entrepreneur.   (4)
   (c) How social entrepreneurs differ from regular entrepreneurs? Discuss the work of any one social entrepreneur and how he /she contribute to the society.   (6.5)

Q3   (a) What is the role of entrepreneurs in the economy and society?   (2)
   (b) How Social Entrepreneurship can enhance a society's value?   (4)
   (c) Explain different types of innovations with suitable examples. Why innovation is the most crucial factor of a successful venture?   (6.5)

UNIT-II

Q4   (a) Explain the different building blocks of a Business Model Canvas with a neat sketch.   (6)
   (b) Consider you are going to start a new venture in IT Sector. Develop your Business Model Canvas with suitable points in nine building blocks.   (6.5)

Q5   (a) What are the advantages and drawbacks of Business Model Canvas?   (6)
   (b) Assume you are going to start a new venture for your innovative product. Develop your Business Model Canvas with suitable points in nine building blocks.   (6.5)

UNIT-III

Q6   (a) How CAGR and NPV help us to understand the performance of a business / project? Explain with suitable examples.   (6.5)
   (b) Write the differences between customer profiling and customer segmentation.   (3)
   (c) Explain the importance of preparing the Balance Sheet for any company.   (3)

P.T.O.

Q7 (a) Write short notes with example for Break Even Analysis and Return on Investment. **(6.5)**

(b) How the '4 Ps of marketing' help the budding entrepreneur to develop their business? **(3)**

(c) Discuss the different Networking effects to promote a new business. **(3)**

UNIT-IV

Q8 (a) What are the 10 key elements of a Business Plan? **(3)**

(b) Describe Critical Risks and Harvest Strategy among them with suitable examples. **(6.5)**

(c) How a company can address the customer needs? **(3)**

Q9 (a) Discuss the road-map to start a new company in India. **(5)**

(b) Explain any two major challenges while incorporating a new company in India. **(5)**

(c) List down the key-points need to remember while presenting a business plan. **(2.5)**

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