

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	(a) Define deep learning and explain its key characteristics.	5M	CO1	L2
	(b) Explain Random Forest and its advantages.	5M	CO1	L3
(OR)				
2.	(a) What is overfitting and underfitting? How can they be mitigated?	5M	CO1	L2
	(b) Differentiate between supervised, unsupervised, and reinforcement learning with examples.	5M	CO1	L2
<u>UNIT-II</u>				
3.	(a) Explain the concept of Artificial Neural Networks and their applications.	5M	CO2	L2
	(b) Discuss the advantages and limitations of deep neural networks compared to traditional machine learning models.	5M	CO2	L2
(OR)				
4.	(a) Explain the gradient descent algorithm and its role in optimizing neural networks.	5M	CO2	L3
	(b) Describe the vanishing and exploding gradient problems in deep networks and suggest solutions.	5M	CO2	L3
<u>UNIT-III</u>				
5.	(a) What are the key features of Keras? Explain how to run Keras on different platforms.	5M	CO3	L2
	(b) Explain the key features and advantages of TensorFlow over traditional machine learning libraries.	5M	CO3	L3

(OR)

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|-----------------------|-----|--|----|-----|----|
| 6. | (a) | What is Multi-class classification? Explain how neural networks are used to classify news articles by topic. | 5M | CO3 | L4 |
| | (b) | Discuss the importance of activation functions in deep learning and compare ReLU, Sigmoid, and Tanh functions. | 5M | CO3 | L2 |
| <u>UNIT-IV</u> | | | | | |
| 7. | (a) | Define convolutional neural networks (CNNs) and explain their significance in image processing. | 5M | CO4 | L2 |
| | (b) | Describe the implementation of Recurrent Neural Networks (RNN) in Keras. | 5M | CO4 | L3 |
| (OR) | | | | | |
| 8. | (a) | Compare max-pooling and average-pooling techniques used in CNNs. | 5M | CO4 | L4 |
| | (b) | Explain the concept of Representation Learning. | 5M | CO4 | L3 |
| <u>UNIT-V</u> | | | | | |
| 9. | (a) | What are Generative Adversarial Networks (GANs)? Explain their working. | 5M | CO5 | L3 |
| | (b) | What is reinforcement learning? Explain the key differences between model-based and model-free learning. | 5M | CO5 | L3 |
| (OR) | | | | | |
| 10. | (a) | Explain the impact of Deep Learning on Natural Language Processing. | 5M | CO5 | L4 |
| | (b) | Explain the concept of Machine Vision. | 5M | CO5 | L3 |
| <u>UNIT-VI</u> | | | | | |
| 11. | (a) | What is an autoencoder? Explain various types of regularized autoencoders. | 5M | CO6 | L2 |
| | (b) | Discuss the concept of Restricted Boltzmann Machines. | 5M | CO6 | L3 |
| (OR) | | | | | |
| 12. | (a) | Explain Deep Belief Networks and their applications. | 5M | CO6 | L4 |
| | (b) | Compare Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs) with respect to image generation tasks. | 5M | CO6 | L2 |

Time: 3 Hours

Max Marks: 60

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			Marks	CO	Blooms Level
<u>UNIT-I</u>					
1.	a	Define Big Data and explain its significance in modern applications.	5	CO1	L1
	b	Discuss the role of analytics in decision-making processes involving Big Data.	5	CO1	L2
(OR)					
2.	a	Explain the introduction to big data platform.	5	CO1	L1
	b	Compare different analytic processes and tools.	5	CO1	L2
<u>UNIT-II</u>					
3.		Describe the working of stream computing architectures and how they handle large-scale data.	10	CO2	L2
(OR)					
4.	a	Explain the structure and working of a stream data model.	5	CO2	L2
	b	How do filtering techniques enhance stream processing?	5	CO2	L1
<u>UNIT-III</u>					
5.	a	Explain the components of Hadoop and how they contribute to data analysis.	5	CO3	L2
	b	Discuss the significance of HDFS and its advantages over traditional file systems.	5	CO3	L3
(OR)					
6.	a	Describe the role of Name Node and Data Node in HDFS.	5	CO3	L2
	b	Explain how Hadoop ensures data replication and fault tolerance.	5	CO3	L1
<u>UNIT-IV</u>					
7.		With a neat sketch, describe the anatomy of a Map Reduce job.	10	CO4	L3
(OR)					
8.	a	What are the different phases of a Map Reduce job? Explain each phase.	5	CO4	L1
	b	How does shuffle and sort work in the Map Reduce framework?	5	CO4	L2
<u>UNIT-V</u>					
9.	a	What are the key functionalities of Zoo Keeper in a Hadoop ecosystem?	5	CO5	L1
	b	Explain the purpose of HBase and its role in handling large datasets.	5	CO5	L2
(OR)					
10.		Discuss in detail the role of Pig, Hive, and HBase in managing big data workflows.	10	CO5	L3
<u>UNIT-VI</u>					
11.		List the different types of visualization techniques used in Big Data and explain each?	10	CO6	L3
(OR)					
12.		Explain the role of machine learning in predictive analytics and how it enhances decision-making.	10	CO6	L3

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UNIT-IMarks CO Blooms
Level

- 1 Explain different rain gauges with neat sketches. 10 1 2

(OR)

- 2 a Explain the depth area duration curves. 5 1 2
b The areas enclosed by the adjacent isohyets of a catchment are given in table below. Determine the average depth of rainfall. 5 1 4

Isohyets (cm)	25-30	30-35	35-40	40-45	45-50
Area (sq.km)	10	12	12.5	11	9

UNIT-II

- 3 Discuss the various factors affecting evaporation. 10 2 3

(OR)

- 4 a A storm with a 15cm precipitation produced a direct run off of 8.7cm. The time distribution of the storm is as follows. Estimate the ϕ -index and w- index of the storm. 5 2 4

Time from start in hours	1	2	3	4	5	6	7	8
Incremental rainfall in each hour in cm	0.6	1.35	2.25	3.45	2.7	2.4	1.5	0.75

- b Explain the infiltration capacity curve. 5 2 2

UNIT-III

- 5 Define runoff? Discuss various factors affecting run off over a catchment? 10 3 3

(OR)

- 6 a The hourly ordinates of 2hr unit hydrograph are given below. Derive a 6hr hydrograph for the same catchment. 5 3 4

Time(hr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Discharge (m ³ /s)	0	1	2.7	5	8	9.8	9	7.5	6.3	5	4	2.9	2.1	1.3	0.5	0

- b Explain the methods of baseflow separation. 5 3 2

UNIT-IV

- 7 a State Darcy's Law. Write the limitations of its applicability. 5 4 1

- b A tube well of diameter 30cm penetrates fully an unconfined aquifer. The drawdown in the well is 2m and aquifer thickness is 10m. Calculate the discharge from the tube well. Take permeability of aquifer is 0.05cm/s and radius of influence is 300m. 5 4 4

(OR)

- 8 Derive the equation for discharge from a well fully penetrated in an unconfined aquifer? 10 4 3

UNIT-V

9. a Explain the advantages and ill-effects of irrigation. 5 5 2

- b After how many days will you supply water to soil in order to ensure efficient irrigation of the given crop, it (i) Field capacity of soil : 35% (ii) Permanent wilting point - 15% (iii) Density of soil : 1.5 gm/cm³ (iv) Daily consumption use of water for the given crop : 12 mm. (v) Effective depth of root zone: 80 cm. 5 5 4

(OR)

10. Explain with neat sketches various method of irrigation. 10 5 2

UNIT-VI

11. Design of irrigation canals by Kennedy's theory. 10 6 5

(OR)

12. What are different types of river training works? Explain. 10 6 2

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	Explain in detail about phases of the compiler with neat sketch and examples for each phase separately (OR)	10	CO1	K2
2.	Explain in detail about role of Lexical Analyzer in phases of compiler design.	10	CO1	K2
	<u>UNIT-II</u>			
3.	Construct a Predictive Parser for the Following Grammar: $S \rightarrow AB a$ $A \rightarrow aA \epsilon$ $B \rightarrow bB \epsilon$ (a) Construct the First and Follow sets for the non-terminals S, A, and B. (b) Construct the Predictive Parsing Table for the given grammar. (c) Using the parsing table, show the derivation for the input string aab. Explain each step of the parsing process using the predictive parser. (OR)	10	CO2	K3
4.	Construct the LL(1) parser for the following grammar: $D \rightarrow T L;$ $L \rightarrow L, id id$ $T \rightarrow int float$ (a) Remove left recursion and left factoring (if required) (b) Find first() and follow () for each non-terminal for the resultant grammar (c) Construct LL(1) parsing table (d) Parse the following string (show stack actions clearly) and draw parse tree for the input: int id, id;	10	CO2	K6

UNIT-III

5. Evaluate the following grammar is LR(1) but not LALR(1) $S \rightarrow Aa \mid bAc \mid Bc \mid bBa$ $A \rightarrow d$ $B \rightarrow d$ 10 CO3 K5
(OR)
6. Construct the SLR(1) parser for the following grammar: 10 CO3 K3
 $S \rightarrow L=R$
 $S \rightarrow R$
 $L \rightarrow *R$
 $L \rightarrow id$
 $R \rightarrow L$

UNIT-IV

7. Discuss detailed explanation with example on: 10 CO4 K6
(a) Synthesized attributes
(b) Inherited attributes
(OR)
8. Construct the Syntax Directed Translation (SDT) action for the Four Function Calculator grammar and draw the parse tree for the given input: $4+5*6-7$ 10 CO4 K3

UNIT-V

9. Construct the following statement into triple, indirect triple and quadruple three address code forms: $a = b * -c + b * -c$ 10 CO5 K6
(OR)
10. Discover the three-address code, identify the basic blocks, and draw the control flow graph for the given code segment. 10 CO5 K4
fact(x)
{
 int f = 1;
 for (i = 2; i <= x; i++)
 f = f * i;
 return f;
}

UNIT-VI

11. Determine the Target Machine code for the following C program 10 CO6 K5

```
void main()  
{  
  int b;  
  int a;  
  
  b = 3;  
  a = 12;  
  a = (b + 2) - (a*3)/6;  
}
```


(OR)
12. Explain in detail about peephole optimization for the following code: $a = b - 2 \times c$ 10 CO6 K2

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<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	(a) Derive the wave equation for a TM wave and obtain the field components in rectangular wave guides?	7	1	2
	(b) A hollow rectangular waveguide has dimensions $a=1.5$ cm, $b=1$ cm calculate the cut-off frequency of the TE_{11} mode.	3	1	3
(OR)				
2.	(a) Derive the wave equation for a TE wave and obtain the field components in a rectangular wave guides?	7	1	2
	(b) An air filled circular waveguide is to be operated at a frequency of 6GHz and is to have dimensions such that $fc=0.8$ for TE_{11} mode. Determine the diameter of the waveguide and guide wave length.	3	1	3
<u>UNIT-II</u>				
3.	(a) Explain about E-plane tee with suitable diagram and derive its S-matrix?	7	2	2
	(b) Find the Hybrid ring S-parameters and explain with neat sketch?	3	2	2
(OR)				
4.	Explain the operation of directional coupler and find its S-Matrix?	10	2	2
<u>UNIT-III</u>				
5.	What is velocity modulation? Explain how velocity modulation is utilised in klystron amplifier?	10	3	4
(OR)				
6.	A two cavity klystron is operated at 10GHz with $V_0=1200$ V, $I_0=30$ mA, $D=1$ mm, $L=4$ cm and $R_{sh}=40$ k Ω . Neglecting beam loading, calculate (i) input RF voltage V_1 for a maximum output voltage, (ii) voltage gain and (iii) efficiency.	10	3	3
<u>UNIT-IV</u>				
7.	What are slow wave structures? Explain how a helical TWT achieves amplification?	10	4	2
(OR)				
8.	Explain the features of cylindrical magnetron?	10	4	2
<u>UNIT-V</u>				
9.	Explain about domain formation in Gunn diode? Explain various oscillating modes of Gunn diode?	10	5	2
(OR)				
10.	What are the avalanche transit time devices? Explain the working of TRAPATT diode?	10	5	2
<u>UNIT-VI</u>				
11.	(a) Describe the functioning of each component in a microwave bench setup?	5	6	2
	(b) With the help of necessary experimental setup, describe the measurement of unknown load impedance using slotted line?	5	6	2
(OR)				
12.	(a) Describe the procedure for measurement of Low VSWR and high VSWR using microwave bench?	5	6	2
	(b) Explain the method to measure medium and high microwave powers?	5	6	2

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		Marks	CO	Blooms Level
	<u>UNIT-I</u>			
1.	Explain the memory and register organization of the 8086 microprocessor.	10	1	2
	(OR)			
2.	Draw the timing diagram of the minimum mode in the 8086 microprocessor during read and write cycles.	10	1	3
	<u>UNIT-II</u>			
3.	List and explain the data transfer instructions in the 8086 microprocessor.	10	2	2
	(OR)			
4.	Write an assembly language program in 8086 to perform addition, subtraction, multiplication, and division of given operands. Perform BCD operations for addition and subtraction.	10	2	3
	<u>UNIT-III</u>			
5.	Discuss the functional block diagram of the 8259A Programmable Interrupt Controller.	10	3	3
	(OR)			
6.	Describe the architecture and operation of the 8257 DMA controller.	10	3	3
	<u>UNIT-IV</u>			
7.	List and explain the key features of the 80386 microprocessor.	10	4	2
	(OR)			
8.	Discuss the segmentation and paging of the 80386 and its role in memory management.	10	4	3
	<u>UNIT-V</u>			
9.	What are interrupts or exceptions? How are they handled in ARM processors?	10	5	2
	(OR)			
10.	Discuss various applications where ARM processors are predominantly used.	10	5	3
	<u>UNIT-VI</u>			
11.	Draw the pin diagram of the 8051 microcontroller and explain the function of each pin in detail.	10	6	3
	(OR)			
12.	Explain the addressing modes of the 8051 microcontroller.	10	6	2

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Compare Between Compiler and Interpreter	5	1	3
	b) Construct DFA Which accepts even number of 0's and even number of 1's.	5	1	3
(OR)				
2.	a) Differentiate between pass and Phase.	5	11	2
	b) Discuss about LEX.	5	1	2
<u>UNIT-II</u>				
3.	a) Define a Context Free Grammar. Explain the role of Syntax analyzer.	5	2	2
	b) Write about Ambiguous grammar.	5	2	2
(OR)				
4.	Construct a Predictive parsing Table for following Grammar $G \{E \rightarrow TE', E' \rightarrow +TE'/\epsilon, T \rightarrow FT', T' \rightarrow *FT'/\epsilon, F \rightarrow (E)/id \}$.	10	2	3
<u>UNIT-III</u>				
5.	a) Define a Bottom-up parsing. Explain the Stack implementation of Shift reduce parsing	5	3	2
	b) Explain the Types of LR parsers.	5	3	2
(OR)				
6.	Construct the SLR parsing Table for the following grammar $G \{E \rightarrow TE', E' \rightarrow +TE'/\epsilon, T \rightarrow FT', T' \rightarrow *FT'/\epsilon, F \rightarrow (E)/id \}$.	10	3	3
<u>UNIT-IV</u>				
7.	a) Define a Syntax directed Translation schemes. Explain the S- Attributes and L-Attributes.	5	4	2
	b) Explain the three address code and implementation.	5	4	2
(OR)				
8.	Define a Three Address statement with example. Write quadruples, triples, and indirect triples for the expression $-(a+b)*(c+d)-(a+b+c)$	10	4	2
<u>UNIT-V</u>				
9.	a) Explain the type equivalence and type conversion	5	5	2
	b) Define a Type checking. Explain the type expression	5	5	2
(OR)				
10.	a) Explain the storage allocation strategies.	5	5	2
	b) Discuss about Data structures for symbol table.	5	5	2
<u>UNIT-VI</u>				
11.	a) Write a Basic Blocks Algorithm.	5	6	2
	b) Explain the Loop Optimization.	5	6	2
(OR)				
12.	a) Explain about the target machine	5	6	2
	b) Discuss about Register allocation and assignment.	5	6	2

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) State the governing law for convection heat transfer and describe its mechanism	4	1	L2
	b) Derive the general heat conduction equation in cartesian coordinate system	6	1	L4
	(OR)			
2.	a) How adding insulation differs for a plane wall and a cylinder subjected to convective boundary?	4	1	L3
	b) An insulating glass wall of an air-conditioned room comprises two layers of glass with a sealed air space in between, Thickness of each glass layer is 11mm and the total thickness of wall is 25mm. Determine the heat infiltration if the wall is experiencing 38°C and 21°C temperatures on its left and right sides. Assume glass thermal conductivity 0.9 W/mK and for air 0.026 W/mK.	6	1	L4
	<u>UNIT-II</u>			
3.	a) Define Fin efficiency and effectiveness	4	2	L1
	b) A heat sink designed for the thermal management of electronics comprises 50 straight fins with a thickness of 1.5 mm, a width of 100 mm, and a height of 50 mm. Air at room temperature (28°C) is forced to flow over the fins, providing a heat transfer coefficient of 21 W/m ² K. If the device is designed to maintain a maximum temperature of 80°C, determine the rate of heat dissipation from the heat sink	6	2	L4
	(OR)			
4.	a) Define Biot number and describe its significance.	4	2	L2
	b) A large plate of 50cm thick having $k = 45 \text{ W/m-K}$ and $\alpha = 6 \times 10^{-6} \text{ m}^2/\text{s}$ is initially at a uniform temperature of 50°C. If the temperature is suddenly raised and maintained at 500°C, find (i) Temperature at a depth of 15 cm from the surface after 3 hours	6	2	L4
	<u>UNIT-III</u>			
5.	a) Prove that Nusselt number is function of Reynolds and Prandtl number in a forced convection heat transfer	6	3	L4
	b) Define Reynolds number and Grashof number	4	3	L1
	(OR)			
6.	a) Differentiate the free and forced convection	3	3	L2
	b) A hot square plate 50 cm x 50 cm, at 100°C is exposed to atmosphere air at 20°C. Find the heat transfer coefficient: (i) if the plate is kept vertical (ii) if the plate is kept at horizontal	7	3	L4

UNIT-IV

7. a) Explain the formation of hydrodynamic boundary layer for a flow through pipe 4 4 L2
b) Air at atmospheric pressure and 200°C flows over a plate with a velocity of 5 m/s. The plate is 15mm wide and is maintained at a temperature of 120°C. Calculate the local heat transfer coefficient at a distance of 0.5 m from the leading edge. Assume that flow is on one side of the plate. Take $\rho = 0.815 \text{ kg/m}^3$, $\mu = 24.5 \times 10^{-6} \text{ Ns/m}^2$, $Pr = 0.7$ and $k = 0.0364 \text{ W/m K}$. 6 4 L4

(OR)

8. a) Differentiate pool boiling and flow boiling with appropriate examples 4 4 L2
b) A vertical square plate, 30 X 30cm is exposed to steam at atmospheric pressure. The plate temperature is 98°C, Calculate the heat transfer and the mass of steam condensed per hour 6 4 L4

UNIT-V

9. a) Classify heat exchangers 4 5 L2
b) The engine oil at 150°C is cooled at 80°C in a parallel flow heat exchanger by water entering at 25°C and leaving at 60°C. Estimate the exchanger effectiveness and number of transfer units. If the fluid flow rates and inlet conditions remain unchanged, work out the lowest temperature to which the oil may be cooled by increasing length of the exchanger. 6 5 L4

(OR)

10. a) What are the limitations of adopting LMTD method in heat exchanger analysis 4 5 L3
b) Hot oil with a capacity of 2500 W/K flows through a double pipe heat exchanger, it enters at 360°C and leaves at 300°C. Cold fluid enters at 30°C and leaves at 200°C. If overall heat Transfer co-efficient $U = 800 \text{ W/m}^2 \text{ -K}$ determine the heat exchanger area required for (i) Parallel flow and (ii) counter flow 6 5 L4

UNIT-VI

11. a) State and prove Kirchoff Law 5 6 L4
b) Two black square plates ($\epsilon=1$) of size 1 m x 1 m are placed parallel to each other a distance of 4m. One plate is maintained at a temperature of 900°C and other at 400°C. Find the net exchange of energy due to radiation between two plates. 5 6 L4

(OR)

12. a) Differentiate diffusion and convective mass transfer 4 6 L2
b) A 18 cm diameter heating pipe (emissivity=0.8) at surface temperature 475 K has been placed centrally in a brick duct (emissivity = 0.9) of 25 cm side square section and at 300 K temperature. Determine the radiation heat loss from each metre of the heating pipe. 6 6 L4

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UNIT-I

1. a) Explain Phases of compiler with neat diagram. 7M
- b) Show the output of each phase using the example of the following statement. 7M
Position: = initial + rate * 60.

(OR)

2. a) Define the role of lexical analyser. 7M
- b) Define lexeme, token, pattern. Identify the lexemes that make up the tokens in the following program fragment. Indicate the corresponding token and pattern. 7M
void swap (int i, int j)
{
 int t;
 t=i;
 i=j;
 j=t;
}

UNIT-II

3. Construct the predictive parsing table for the following grammar. 14M
 $E \rightarrow TE^1$
 $E^1 \rightarrow +TE^1 \mid \epsilon$
 $T \rightarrow FT^1$
 $T^1 \rightarrow *F T^1 \mid \epsilon$
 $F \rightarrow (E) \mid id$

(OR)

4. Construct SLR parsing Table for the following grammar 14M
 $E \rightarrow E+T \mid T$
 $T \rightarrow T * F \mid F$

UNIT-III

5. a) Describe about the different types of three address statements in detail with example? 7M
- b) Construct three address code for the following code segment in C language. 7M
while(a+b<2)
{
 sum=sum+d*d*d;
 a=a-1;
}

(OR)

6. a) What is a syntax tree? Define the syntax tree and postfix notation for the following expression 7M
$$a: =b*-c + b * - c$$
- b) Explain the data structures used for symbol table implementations. 7M

UNIT-IV

7. a) Construct DAG for the following basic block 7M
$$\begin{aligned} a &= b+c \\ b &= a -d \\ c &= b+c \\ d &= a - d \end{aligned}$$
- b) Explain about the live variables and live variable analysis? 7M
- (OR)**
8. a) What is a basic block? Write an algorithm to partition sequence of three address statement into basic block and flow graph? 7M
- b) Construct the DAG for $a=b*-c+d*-c$ 7M

UNIT-V

9. a) Explain about generic code generation algorithm? 7M
- b) Compare and contrast machine independent and machine dependent code optimization techniques? 7M
- (OR)**
10. a) Describe in detail about peephole optimization techniques? 7M
- b) Explain various object code forms in detail? 7M