

AR16

CODE: 16EE2010

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, May, 2025

**Electro Magnetic Field Theory
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) State and explain Coulomb's law in vector form 6M
- b) Derive an expression for \mathbf{E} due to infinite line of charge placed along Z-axis using Gauss's law. 8M

(OR)

2. a) Determine electric field intensity due to a surface charge 7M
- b) What are the applications of Gauss's law and state its limitations? 7M

UNIT-II

3. a) What are Laplace and Poisson's equations 7M
- b) Derive an expression for torque experienced by a dipole placed in an electric field? 7M

(OR)

4. Discuss the boundary conditions between two dielectrics with the help of neat sketches. 14M

UNIT-III

5. Calculate the magnetic field due to a finite current element along z-axis at a point p at 'r' away from y-axis. 14M

(OR)

6. a) Discuss Oersted's experiment in detail 6M
- b) Derive an expression for torque on a current loop placed in a magnetic field. 8M

UNIT-IV

7. a) Calculate the inductance in a solenoid. 7M
- b) Derive an expression for Lorentz force equation. 7M

(OR)

8. A point charge of $Q=1.2\text{C}$ has velocity $\mathbf{v}=5\mathbf{a}_x+2\mathbf{a}_y-3\mathbf{a}_z$, find the magnitude of the force exerted on the charge if
a) $\mathbf{E}=-18\mathbf{a}_x+5\mathbf{a}_y-10\mathbf{a}_z$ b) $\mathbf{B}=4\mathbf{a}_x+4\mathbf{a}_y+3\mathbf{a}_z$ c) Both are present simultaneously 14M

UNIT-V

9. a) Find the conduction and displacement current densities in a material having conductivity of 10^{-3} S/m and $\epsilon_r=2.5$ if the electric field in the material is $\mathbf{E}=5\sin(9\cdot 10^9 t)\mu\text{V/m}$ 7M
- b) Write max well's equations in integral form 7M

(OR)

10. a) Define displacement current and explain its importance. 7M
- b) Write modified max well's equation for time varying fields. 7M

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	Discuss how AI technique can be used to solve tic-tac-toe problem. (OR)	10M	CO1	K3
2.	What do you mean by State Space Search? Describe state space representation for 8 puzzle Problem and explain how the problem can be solved by state space search.	10M	CO1	K3
<u>UNIT-II</u>				
3.	Explain about Hill climbing algorithm and mention the problems with hill climbing. Differentiate between Hill climbing and steepest-Ascent Hill Climbing Algorithm (OR)	10M	CO2	K2
4.	Using constraint satisfaction procedure to solve the following cryptarithmic problem. <div style="text-align: center;"> S E N D + M O R E M O N E Y </div>	10M	CO2	K3
<u>UNIT-III</u>				
5.	Explain the algorithm of converting well-formed formulas to clause form. (OR)	10M	CO3	K2
6.	Explain the resolution algorithm for predicate logic in detail.	10M	CO3	K2
<u>UNIT-IV</u>				
7.	What do you mean by matching? Explain complex and approximate matching? (OR)	10M	CO4	K2
8.	Explain how a semantic network gets evolved into a frame structure with an example.	10M	CO4	K2
<u>UNIT-V</u>				
9.	a) Explain Dempster-Shafer theory in detail? b) Explain about Bayesian Theorem in detail?	5M 5M	CO5 CO5	K2 K2
<u>UNIT-VI</u>				
10.	Explain in detail about the various predicates and actions used by STRIPS to solve the Block's World problem.	10M	CO5	K3
<u>UNIT-VI</u>				
11.	a) Explain about MYCIN Expert System in detail. b) What makes an Expert system feasible? Why we use Expert system? (OR)	5M 5M	CO6 CO6	K2 K2
12.	What do you mean by Expert System? Explain Expert system architecture with neat diagram?	10M	CO6	K2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B. Tech II Semester Supplementary Examinations, May, 2025

DESIGN AND ANALYSIS OF ALGORITHMS

(COMMON TO CSE & IT Branches)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
	<u>UNIT-I</u>			
1.	Explain about various pseudo-code conventions. (OR)	10	1	2
2.	Describe about various asymptotic notations used for performance analysis of algorithms?	10	1	3
	<u>UNIT-II</u>			
3.	Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm. (OR)	10	2	3
4.	Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity	10	2	3
	<u>UNIT-III</u>			
5.	What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example. (OR)	10	3	2
6.	Write about single source shortest path problem.	10	3	2
	<u>UNIT-IV</u>			
7.	Explain Optimal Binary Search tree. (OR)	10	4	2
8.	Solve the following instance of 0/1 Knapsack problem using Dynamic programming $n = 3$; $(W_1, W_2, W_3) = (3, 5, 7)$; $(P_1, P_2, P_3) = (3, 7, 12)$; $M = 4$.	10	4	3
	<u>UNIT-V</u>			
9.	a. Write the BFS algorithm. b. Trace the BFS algorithm for the given graph with source as node D	4 6	5 5	2 3
	(OR)			
10.	Write an algorithm for N – queen's problem. Give time and space complexity for 8 – queen's problem.	10	5	2
	<u>UNIT-VI</u>			
11.	Explain in detailed about NP-Hard and NP-Complete classes. (OR)	10	6	2
12.	Write an algorithm schema LC Branch and bound which searches for a least-cost answer node and explain	10	6	3

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	BTL
UNIT-I				
1.	a) Discuss about working of an RC circuit as an attenuator.	5M	CO1	L-2
	b) A square wave whose peak to peak amplitude is 2 V extends ± 1 V with respect to ground. The duration of the positive section is 0.1 s and that of the negative section is 0.2 s. If this waveform is impressed upon an RC differentiator circuit whose time constant is 0.2 s, what are the steady-state maximum and minimum values of the output waveform?	5M	CO1	L-3
(OR)				
2.	a) Derive the step response of an RC lowpass circuit. Draw the step response and label it.	5M	CO1	L-3
	b) Deduce the response of High-pass RC circuit for ramp wave input.	5M	CO1	L-2
UNIT-II				
3.	Classify different types of clipper circuits. Draw their circuits and explain their operation and also transfer characteristics	10M	CO2	L-2
(OR)				
4.	a) Discuss the operation of a two level slicer.	5M	CO2	L2
	b) Explain the steps to analyse a clamping network with an example.	5M	CO2	L-3
UNIT-III				
5.	a) Discuss about the saturation parameters of a transistor.	5M	CO3	L-2
	b) Define the following switching times of transistor: i. Rise time ii. Fall time iii. Storage time iv. Turn off time v. Delay time.	5M	CO3	L-2
(OR)				
6.	a) Explain about diode forward recovery time and diode reverse recovery time	5M	CO3	L-2
	b) A self-bias bistable multivibrator uses Si transistors having $h_{FE(min)} = 50$, $V_{CC} = 18$ V, $R_1 = R_2$, $I_{C(sat)} = 5$ mA. Find the component values R_E , R_C , R_1 and R_2 .	5M	CO3	L-3
UNIT-IV				
7.	a) Explain the operation of collector coupled Monostable multivibrator	5M	CO4	L-2
	b) With the help of a neat diagram, explain the operation of collector coupled astable multivibrator.	5M	CO4	L-3
(OR)				
8.	a) Explain the triggering method of Monostable multivibrator	5M	CO4	L-2
	b) Discuss about the operation of Astable multivibrator as a voltage to frequency converter and derive the expression for time period of it.	5M	CO4	L-2
UNIT-V				
9.	a) Draw the circuit and explain the operation of Boot strap generator?	5M	CO5	L-2
	b) Discuss about Transistor Bootstrap time base generator.	5M	CO5	L-2
(OR)				
10.	a) Draw the circuit of a miller integrator and explain how it improves the linearity of the sweep waveform.	5M	CO5	L-2
	b) Derive the expression for frequency of oscillations of UJT Relaxation oscillator?	5M	CO5	L-3
UNIT-VI				
11.	a) Differentiate unidirectional and bidirectional sampling gates.	5M	CO6	L-3
	b) Explain any one of the applications of sampling gates?	5M	CO6	L-2
(OR)				
12.	a) Why pedestal is seen in the output of a sampling gate and explain how it can be reduced?	5M	CO6	L-3
	b) Explain with the help of a neat circuit diagram the working of a Bi directional Sampling gate.	5M	CO6	L-2

Python Programming
(Common to CE, EEE & ME Branches)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- | | | Marks | CO | BTL |
|-------------|---|-------|----|-----|
| 1. | a Explain the key differences between Python syntax and other programming languages like C or Java. | 5 | 1 | K2 |
| | b Given a Python script with incorrect flow control, analyze and correct the errors:
<pre>x = 10 if x > 5: print("Greater than 5") else: print("Less than or equal to 5")</pre> Give reasons for the errors occurred. | 5 | 1 | K3 |
| (OR) | | | | |
| 2. | a Implement a nested loop to print the following pattern:
<pre>* * * * * * * * * * * * * * *</pre> | 5 | 1 | K3 |
| | b Write a program to calculate the sum of all even numbers in a given range using a for loop. | 5 | 1 | K3 |

UNIT-II

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|----|---|---|---|----|
| 3. | a When would you prefer a set over a list? Provide a practical example. | 5 | 2 | K2 |
| | b Write a program that extracts all valid email from a given text file using regex. | 5 | 2 | K3 |

(OR)

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|----|---|---|---|----|
| 4. | a Name any three list methods in Python. Explain. | 5 | 2 | K2 |
| | b Write a python program to implement Stack. | 5 | 2 | K3 |

UNIT-III

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|----|---|---|---|----|
| 5. | a What is the difference between text files and binary files? How do you handle them in Python? | 5 | 3 | K2 |
| | b Create a function that writes a list of numbers into a file and then reads them back. | 5 | 3 | K3 |

(OR)

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|---|---|--|---|---|----|
| 6 | a | Write the python program to read a file line by line into a list. | 5 | 3 | K3 |
| | b | Write a python program to find sum of natural numbers using recursive function | 5 | 3 | K3 |

UNIT-IV

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|----|---|---|---|---|----|
| 7. | a | What is the difference between importing a module and importing a module attribute? Explain with example. | 5 | 4 | K2 |
| | b | How does Python handle namespaces to avoid variable conflicts? | 5 | 4 | K2 |

(OR)

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|----|---|---|---|---|----|
| 8. | a | Explain the concept of built-in modules and user-defined modules with examples. | 5 | 4 | K2 |
| | b | What is the purpose of <code>__name__ == "__main__"</code> in a Python script? | 5 | 4 | K2 |

UNIT-V

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|----|---|---|---|---|----|
| 9. | a | What is self in Python? Why is it needed in instance methods? | 5 | 5 | K2 |
| | b | Write a Python program that demonstrates class inheritance with a parent and child class. | 5 | 5 | K3 |

(OR)

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|-----|---|---|---|---|----|
| 10. | a | Compare method overriding and method overloading in Python. | 5 | 5 | K3 |
| | b | Explain the difference between a class and an object. | 5 | 5 | K2 |

UNIT-VI

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|-----|---|--|---|---|----|
| 11. | a | What is the significance of <code>re.match()</code> , <code>re.search()</code> , and <code>re.findall()</code> ? | 5 | 6 | K2 |
| | b | Write a program that extracts all capitalized words from a file. | 5 | 6 | K3 |

(OR)

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|-----|--|---|----|---|----|
| 12. | | Write a Python program to check the validity of a password (input from users). Validation: | 10 | 6 | K3 |
| | | <ul style="list-style-type: none">• At least 1 letter between [a-z] and 1 letter between [A-Z].• At least 1 number between [0-9].• At least 1 character from [\$#@].• Minimum length 6 characters.• Maximum length 12 characters. | | | |