MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(AutonomousInstitution–UGC,Govt.ofIndia)

(AffiliatedtoJNTU,Hyderabad,ApprovedbyAICTE-AccreditedbyNBA&NAAC –'A'Grade,ISO9001:2008Certified)

Maisammaguda,Dhulapally,Secunderabad–500100.

DEPARTMENTOF
ELECTRONICS & COMMUNICATION ENGINEERING

III B.TECH II SEMESTER VLSI DESIGN
QUESTION BANK (2024–25)

R22

Code No: R22A0414

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Model Paper-1

VLSI Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper consists two parts A and B

Part A compulsory which carries 10 marks answer all questions.

Part B Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks

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PART-A (10Marks)

(Write all answers of this Part at one place)

1.a)	Give the statement of Moore's Law.	[1M]
b)	Define threshold voltage of MOS transistor.	[1M]
c)	What is stick diagram?	[1M]
d)	Write the limitation of scaling.	[1M]
e)	Explain about transmission gate.	[1M]
f)	Define sheet resistance.	[1M]
g)	Write the output equations of full adder.	[1M]
h)	Compare full custom and semi custom.	[1M]
i)	What is need of CMOS testing?	[1M]
j)	Define controllability.	

PART-B (50Marks)

SECTION-I

2.a)	Explain the step-by-step NMOS fabrication process in detail with neat diagrams	[5M]
b)	What is the figure of merit of a MOS transistor? Mention the suitable expression for figure of merit	[5M]
	OR	
3.a)	Derive the relationship between drain to source current I_{ds} verses drain to source voltage V_{ds} in non-saturated and saturated region.	[5M]
b)	Define transconductance.	[5M]

SECTION-II

4.a)	Explain the VLSI Design Flow using Y chart Diagram.	[5M]
b)	Draw the Stick diagram and layout for CMOS Inverter	[5M]
	OR	
5.a)	Illustrate the lambda-based design rules with neat sketches.	[5M]
b)	Why scaling is required? Write the scaling factors for different types of device parameters?	[5M]

SECTION-III

6.a)	Clearly Explain the AOI and OAI implementation using CMOS design style with neat	[5M]

diagrams.

b)	Explain about the Pseudo NMOS and Dynamic Logic	[5M]

OR

7.a)	Discuss in detail about Driving large Capacitive Loads	[5M]
b)	Calculate on resistance of an inverter from VDD to GND. If n- channel sheet resistance Rsn=104Ω per square and P-channel sheet resistance Rsp = 3.5 × 104 Ω per square. (Zpu=4:4 and Zpd=2:2).	[5M]

SECTION-IV

8.a)	Design and implement 4-bit ripple carry adder.	[5M]
b)	Design and implement 4-bit carry lookahead adder.	[5M]

OR

9.a)	Draw the Architecture of FPGA and explain	[5M]
b)	Discuss the design Approach for Full-custom and Semi-custom devices	[5M]

SECTION-V

10.a)	Explain the different fault models in VLSI testing with examples.	[5M]
b)	Explain about the controllability and Observability	[5M]

OR

11.a)	Explain in detail about BIST.	[5M]
b)	Explain about ATPG	[5M]

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R22

Code No: R22A0414

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Model Paper-2

VLSI Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper consists two parts A and B

Part A compulsory which carries 10 marks answer all questions.

Part B Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks

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PART-A (10Marks)

(Write all answers of this Part at one place)

1.a)	Compare CMOS and BJT.	[1M]
b)	Define figure of merit.	[1M]
c)	Explain importance of stick diagram.	[1M]
d)	Draw layout diagram of CMOS inverter.	[1M]
e)	Explain about transmission gate.	[1M]
f)	Define standard units of capacitance.	[1M]
g)	What is carry save adder?	[1M]
h)	What are the parameters influence low power VLSI design?	[1M]
i)	Define Observability.	[1M]
j)	Explain stuck at faults.	

PART-B (50Marks)

SECTION-I

2.	Explain NMOS Fabrication steps with neat sketches.	[10M]
	OR	
3.a)	Explain how the BICOMS inverter performance can be improved.	[5M]
b)	Explain various regions of CMOS inverter transfer characteristics	[5M]

SECTION-II

4.a)	Design a stick diagram for NMOS EX-OR gate	[5M]
b)	Discuss about the Limitations of Scaling	[5M]
	OR	
5.a)	Describe the VLSI Design Flow in detail with diagram	[5M]
b)	Draw the layout for CMOS inverter	[5M]

SECTION-III

6.a)	Explain the requirement and operation of pass transistor and transmission gates and how the switch logic can be implemented using Pass Transistors	[5M]
b)	Draw and explain the structure of AND and NAND using pseudo nmos logic	[5M]
	OR	

7.a)	Discuss about the methods for driving large capacitive loads.	[5M]
b)	Explain the concept of domino logic.	[5M]

SECTION-IV

8.a)	Explain the working of serial – parallel multiplier.	[5M]
b)	Discuss about the full custom design with an example.	[5M]

OR

9.a)	Explain the detail architecture of FPGA.	[5M]
b)	Explain the difference between FPGA and CPLD.	[5M]

SECTION-V

10.a)	Illustrate the CMOS testing.	[5M]
b)	Explain the chip level testing techniques.	[5M]

OR

11.a)	Explain the operation of BIST.	[5M]
b)	Briefly discuss about the Design strategies for test.	[5M]

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R22

Code No: R22A0414

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Model Paper-3

VLSI Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper consists two parts A and B

Part A compulsory which carries 10 marks answer all questions.

Part B Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks

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PART-A (10Marks)

(Write all answers of this Part at one place)

1.a)	Explain microeletronic evolution.	[1M]
b)	Explain pass transistor logic.	[1M]
c)	Draw layout of CMOS NAND Gate.	[1M]
d)	Explain about Lambda based design rules.	[1M]
e)	Discuss about Domino CMOS logic.	[1M]
f)	Define the terms Fan-in and Fan-out.	[1M]
g)	Design ripple carry adder.	[1M]
h)	Explain about standard cells.	[1M]
i)	Discuss about ATPG.	[1M]
j)	Define BIST.	

PART-B (50Marks)

SECTION-I

2.a)	Explain CMOS fabrication in Twin-Tub Process.	[5M]
b)	Derive pull up to pull down ratio of NMOS inverter driven by another NMOS inverter.	[5M]
	OR	
3.a)	Explain about various pull up networks.	[5M]
b)	Design Bi-CMOS inverter and explain operation.	[5M]

SECTION-II

4.a)	Draw stick and layout diagrams for an 3-input NOR gate.	[5M]
b)	Explain stick diagram with suitable example.	[5M]
	OR	
5.a)	Write lambda based design rules for wires, contacts and transistors.	[5M]
b)	Explain VLSI Design flow in detail.	[5M]

SECTION-III

6.	What are the alternative gate circuits and explain with examples.	[10M]
	OR	
7.	Describe about the methods for driving large capacitive load.	[10M]

SECTION-IV

8.a)	Design carry skip adder and explain operation.	[5M]
b)	Design multiplier.	[5M]

OR

9.	What is FPGA? Explain with neat sketches and also write advantages, disadvantages.	[5M]

SECTION-V

10.a)	Explain about test principles.	[5M]
b)	Explain fault models.	[5M]

OR

11.	Discus about design for testability.	[10M]

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R22

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Model Paper-4

VLSI Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper consists two parts A and B

Part A compulsory which carries 10 marks answer all questions.

Part B Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks

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PART-A (10Marks)

(Write all answers of this Part at one place)

1.a)	Define gm of MOS transistor.	[1M]
b)	Draw transfer characteristics of CMOS inverter.	[1M]
c)	Define scaling and explain it.	[1M]
d)	Explain difference between stick diagram and layout diagram.	[1M]
e)	What are the issues involved in driving large capacitive loads in VLSI circuits.	[1M]
f)	Explain the importance of wiring capacitance of a MOS transistor.	[1M]
g)	Explain the difference between EPROM and EEPROM.	[1M]
h)	Draw 2-bit comparator.	[1M]
i)	Explain difference between PLA and PAL.	[1M]
j)	Define controllability and observability with respect to testing	[1M]

PART-B (50Marks)

SECTION-I

2.	Draw the fabrication steps of CMOS transistor and explain its operation in detail.	[10M]
	OR	
3.a)	Discuss the Basic Electrical Properties of MOS and BiCMOS Circuits.	[5M]
b)	Derive the expression for transfer characteristics of CMOS Inverter.	[5M]

SECTION-II

4.a)	Explain λ-based Design Rules in VLSI circuit Design.	[5M]
b)	Draw the Layout Diagrams for CMOS Inverter.	[5M]
	OR	
5.a)	Draw the Layout Diagrams for NAND Gate using nMOS.	[5M]
b)	Why scaling is required? Write the scaling factors for different types of device parameters?	[5M]

SECTION-III

6.a)	Clearly Explain the AOI and OAI implementation using CMOS design style with neat diagrams.	[5M]
b)	Explain about the Pseudo NMOS , Dynamic Logic and Domino logic	[5M]

OR

7.a)	Discuss in detail about Driving large Capacitive Loads	[5M]
b)	Calculate on resistance of an inverter from VDD to GND. If n- channel sheet resistance Rsn=104Ω per square and P-channel sheet resistance Rsp = 3.5 × 104 Ω per square. (Zpu=4:4 and Zpd=2:2).	[5M]

SECTION-IV

8.a)	Design and implement 4-bit ripple carry adder.	[5M]
b)	Design and implement 4-bit carry lookahead adder.	[5M]

OR

9.	Draw the Architecture of CPLD and explain	[10M]

SECTION-V

10.a)	Why the chip testing is needed? At what levels testing a chip can occur?	[5M]
b)	Why stuck-at faults occur in CMOS circuits? Explain with suitable logical diagram.	[5M]

OR

11.a)	Explain in detail about BIST.	[5M]
b)	Explain about ATPG in VLSI.	[5M]

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FUNDAMENTALS OF CYBER SECURITY

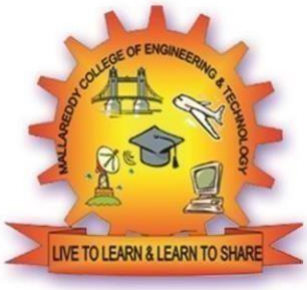
(R22A6215)

Question Bank

B. TECH III YEAR – II SEM

(2024-2025)

Prepared by,
M Ramanjaneyulu
Associate Professor



DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALLA REDDY COLLEGE OF ENGINEERING &TECHNOLOGY

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Maisammaguda, Dhulapally (Post Via. Hakimpet), Secunderabad – 500100,
Telangana State, India

R22

Code No: R226215

MallaReddy College of Engineering & Technology

B. Tech III Year II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(10 Marks)

1.a)	What is computer sabotage?	[1]
b)	Write about web jacking.	[1]
c)	Write the services in cloud computing.	[1]
d)	Explain types of cyber stalkers.	[1]
e)	What is vishing?	[1]
f)	Write about LDAP security.	[1]
g)	What is antikey logger?	[1]
h)	What is SQL injection?	[1]
i)	What is social computing?	[1]
j)	List the security risks in social media.	[1]

PART - B

(50 Marks)

2.a)	Write about phonographic offences and password sniffing.	
b)	Write Indian laws related to hacking.	[5+5]
	OR	
3.a)	Give a note on Indian perspectives on cybercrimes.	
b)	What is email spoofing? Explain in detail.	[5+5]
4.a)	Explain attack vector in detail.	
b)	Discuss about the classification of social engineering.	[5+5]
	OR	
5.a)	Draw a plan of cybercriminal for attacking and explain briefly.	
b)	Explain how does cyber stalking works in real life?	[5+5]
6.a)	Give a note on trends in mobility.	
b)	Explain the security challenges for mobile devices.	[5+5]
	OR	
7.a)	Explain RAS security for mobile devices.	
b)	Elaborate attacks on mobiles.	[5+5]

8.a) Explain different types of viruses.
b) Explain methods of phishing in detail. [5+5]

OR

9.a) Discuss about classifications of Dos attacks.
b) Describe about steganography. [5+5]

10.a) Explain internal costs of organizations associate with cyber security incidents.
b) Write the challenges of organization for social computing. [5+5]

OR

11.a) Write the implications of organization for security in cloud computing.
b) Write about web threats for an organization. [5+5]

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R22

Code No: R22A6215

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 60**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Discuss about Internet Governance.	**[5M]**
	B	Illustrate about CIA Triad.	**[5M]**
OR			
2	***A***	Distinguish between Software attacks and Hardware attacks.	**[5M]**
	B	Explain about Security Models.	**[5M]**

SECTION-II

3	***A***	Discuss about the roles of International Law.	**[5M]**
	B	Describe the need for Computer Forensics.	**[5M]**
OR			
4	***A***	Explain about the INDIAN Cyberspace.	**[5M]**
	B	Illustrate about various approaches that are used for e-mail forensic.	**[5M]**

SECTION-III

5	***A***	Explain about the trends in Mobility.	**[5M]**
	B	Illustrate about the attacks on Mobile-Cell Phones.	**[5M]**
OR			
6	***A***	Discuss about the Organizational Measures for Handling Mobile.	**[5M]**
	B	Describe about the Physical Security Countermeasures for protecting Laptops.	**[5M]**

SECTION-IV

7	***A***	Distinguish about various types of web threats for Organizations.	**[5M]**
	B	Discuss about social computing and the associated challenges for organizations.	**[5M]**
OR			
8	***A***	Explain about the ethical dimension of cybercrimes.	**[5M]**
	B	Describe the Psychology, mindset and skills of Hackers.	**[5M]**

SECTION-V

9	***A***	Discuss about various Data Privacy attacks.	**[10M]**
OR			
10	***A***	Illustrate about the Fundamental concepts in privacy issues.	**[7M]**
	B	Explain about Privacy policies in different languages.	**[7M]**

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R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Discuss about Internet Governance.	**[7M]**
	B	Illustrate about CIA Triad.	**[7M]**
OR			
2	***A***	Distinguish between Software attacks and Hardware attacks.	**[7M]**
	B	Explain about Security Models.	**[7M]**

SECTION-II

3	***A***	Discuss about the roles of International Law.	**[7M]**
	B	Describe the need for Computer Forensics.	**[7M]**
OR			
4	***A***	Explain about the INDIAN Cyberspace.	**[7M]**
	B	Illustrate about various approaches that are used for e-mail forensic.	**[7M]**

SECTION-III

5	***A***	Explain about the trends in Mobility.	**[7M]**
	B	Illustrate about the attacks on Mobile-Cell Phones.	**[7M]**
OR			
6	***A***	Discuss about the Organizational Measures for Handling Mobile.	**[7M]**
	B	Describe about the Physical Security Countermeasures for protecting Laptops.	**[7M]**

SECTION-IV

7	***A***	Distinguish about various types of web threats for Organizations.	**[7M]**
	B	Discuss about social computing and the associated challenges for organizations.	**[7M]**
OR			
8	***A***	Explain about the ethical dimension of cybercrimes.	**[7M]**
	B	Describe the Psychology, mindset and skills of Hackers.	**[7M]**

SECTION-V

9	***A***	Discuss about various Data Privacy attacks.	**[10M]**
OR			
10	***A***	Illustrate about the Fundamental concepts in privacy issues.	**[7M]**
	B	Explain about Privacy policies in different languages.	**[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 60**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Discuss about the layers of security.	**[5M]**
	B	Illustrate about Challenges and Constraints in Cyber Security.	**[5M]**
		OR	
2	***A***	Explain about the taxonomy of various attacks.	**[5M]**
	B	Discuss about the reasons for IP spoofing and how to protect from IP Spoofing.	**[5M]**

SECTION-II

3	***A***	Illustrate about Cyber Security Regulations.	**[5M]**
	B	Discuss about challenges in Computer Forensics.	**[5M]**
		OR	
4	***A***	Describe about Forensics Investigation.	**[5M]**
	B	Explain about National Cyber Security Policy.	**[5M]**

SECTION-III

5	***A***	Explain about the Proliferation of mobile and wireless devices.	**[5M]**
	B	Illustrate about Credit Card Frauds in Mobile and Wireless Computing Era.	**[5M]**
		OR	
6	***A***	Discuss about Registry Settings for Mobile Devices.	**[5M]**
	B	Explain about Security Implications for Organizations.	**[5M]**

SECTION-IV

7	***A***	Explain about the cost of cybercrimes and IPR issues.	**[5M]**
	B	Discuss about security risks and perils for organizations.	**[5M]**
		OR	
8	***A***	Explain about the intellectual property in the cyberspace.	**[5M]**
	B	Describe about evils and perils involved in web threats for organizations.	**[5M]**

SECTION-V

9	***A***	Explain about Data linking and profiling.	**[5M]**
	B	Illustrate about the privacy policy languages.	**[5M]**
		OR	
10	***A***	Describe the privacy in medical domain.	**[5M]**
	B	Discuss the various types of attacks related to data privacy.	**[5M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 60**

Answer Any **Five** Questions
All Questions carries equal marks.

*****

1	a).Describe active attacks and passive attacks.	**[5M]**
	b). Explain in detail about motive of attackers.	**[5M]**
2	a).Explain briefly Cyber Threats-Cyber Warfare.	**[5M]**
	b).Describe the overview of Internet Governance – Challenges and Constraints.	**[5M]**
3	a).Explain briefly the concept of digital forensics with example.	**[5M]**
	b). Describe the overview Cyber Security Regulations.	**[5M]**
4	a).Write about Historical background of Cyber forensics.	**[5M]**
	b).Explain briefly Digital Forensics Lifecycle.	**[5M]**
5	a).Explain, Cybercrime in Mobile and Wireless Devices?	**[5M]**
	b).Give a note on Attacks on Mobile/Cell Phones.	**[5M]**
6	Give a note on Security Challenges Posed by Mobile Device.	**[10M]**
7	Describe the overview cost of cybercrimes and IPR issues.	**[10M]**

8 a). Explain in detail about Data Privacy Attacks. **[5M]**

b).Elaborate Parliament Attack case. **[5M]**

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R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks:70**

Answer Any **Five** Questions
All Questions carries equal marks.

*****

1	a).Describe active attacks and passive attacks.	**[5M]**
	b). Explain in detail about motive of attackers.	**[5M]**
2	a).Explain briefly Cyber Threats-Cyber Warfare.	**[5M]**
	b).Describe the overview of Internet Governance – Challenges and Constraints.	**[5M]**
3	a).Explain briefly the concept of digital forensics with example.	**[5M]**
	b). Describe the overview Cyber Security Regulations.	**[5M]**
4	a).Write about Historical background of Cyber forensics.	**[5M]**
	b).Explain briefly Digital Forensics Lifecycle.	**[5M]**
5	a).Explain, Cybercrime in Mobile and Wireless Devices?	**[5M]**
	b).Give a note on Attacks on Mobile/Cell Phones.	**[5M]**
6	Give a note on Security Challenges Posed by Mobile Device.	**[10M]**
7	Describe the overview cost of cybercrimes and IPR issues.	**[10M]**

8	a). Explain in detail about Data Privacy Attacks.	**[5M]**
	b).Elaborate Parliament Attack case.	**[5M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks: 60**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1 Explain briefly the vulnerabilities, threats, and attacks. What is the relationship between them?

OR

2 Write short notes on
- i) Cyber Crime,
- ii) Cyber terrorism, and
- iii) Cyber Espionage

SECTION-II

3 What is the need for cyber forensics? Discuss briefly about the Digital Forensic Life Cycle.

OR

4 Explain the forensics analysis of Email with suitable example. Discuss briefly the historical background of Cyber forensics.

SECTION-III

5 Discuss the attacks on mobile/ cell phones. Write short notes on
- i) Smishing,
- ii) Vishing and
- iii) Mishing

OR

6 Discuss the popular types of attacks against mobile networks. Discuss the common attacks on Bluetooth devices.

SECTION-IV

7 Explain the organisational implications of software piracy. Compare between the security and privacy.

OR

8 Discuss the different web threats for the organisations. Discuss the social

SECTION-V

9. Discuss the privacy policy languages. Discuss the data privacy attacks.

OR

10 Explain the data linking and profiling. Explain the privacy in medical domain.

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R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks:60**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1	a).Write about layers of security.	**[5M]**
	b).Describe briefly Software attacks, hardware attacks.	**[5M]**
	OR	
2	a).Give a note on Vulnerability, threat, Harmful acts.	**[5M]**
	b).Discuss about Cyber Crime.	**[5M]**

SECTION-II

3	a).Write about Roles of International Law.	**[5M]**
	b). Explain in detail about Forensics Investigation.	**[5M]**
	OR	
4	a).Explain briefly Forensics Analysis of Email.	**[5M]**
	b).Give a note on Challenges in Computer Forensics.	**[5M]**

SECTION-III

5	Describe the overview Registry Settings for Mobile Devices.	**[10M]**
	OR	
6	Discuss about Organizational security Policies and Measures in Mobile Computing Era, Laptops.	**[10M]**

SECTION-IV

7	Explain in detail about web threats for organizations.	**[10M]**
	OR	
8	Write about social computing and the associated challenges for organizations.	**[10M]**

SECTION-V

9	a).Data linking and profiling.	**[5M]**
	b).Describe briefly Indian Banks Lose Millions of Rupees.	**[5M]**
	OR	
10	a).Explain briefly privacy in different domains- medical, financial.	**[5M]**
	b).Describe the overview Pune City Police Bust Nigerian Racket case.	**[5M]**

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R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester

Fundamentals of Cyber Security

Time: 3 hours **Max. Marks:60**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	a).Write about layers of security.	**[5M]**
	b).Describe briefly Software attacks, hardware attacks.	**[5M]**
	OR	
2	a).Give a note on Vulnerability, threat, Harmful acts.	**[5M]**
	b).Discuss about Cyber Crime.	**[5M]**

SECTION-II

3	a).Write about Roles of International Law.	**[5M]**
	b). Explain in detail about Forensics Investigation.	**[5M]**
	OR	
4	a).Explain briefly Forensics Analysis of Email.	**[5M]**
	b).Give a note on Challenges in Computer Forensics.	

SECTION-III

5	Describe the overview Registry Settings for Mobile Devices.	**[10M]**
	OR	
6	Discuss about Organizational security Policies and Measures in Mobile Computing Era, Laptops.	**[10M]**

SECTION-IV

7	Explain in detail about web threats for organizations.	**[10M]**
	OR	
8	Write about social computing and the associated challenges for organizations.	**[10M]**

SECTION-V

9	a). Data linking and profiling.	**[5M]**
	b). Describe briefly Indian Banks Lose Millions of Rupees.	**[5M]**
	OR	
10	a).Explain briefly privacy in different domains- medical, financial.	**[5M]**
	b).Describe the overview Pune City Police Bust Nigerian Racket case.	**[5M]**

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Code No: R22A0412

R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, Model paper-1

Antennas and Wave Propagation

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 10 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

****

PART – A (10 Marks)

1. (a) Define the terms "Beam Area" and "Radiation intensity.
   (b) Compare 'Quarter wave Monopole' and 'Half wave Dipole'.
   (c) List out the salient features of 'Yagi –Uda Array'.
   (d) What are the applications of 'Horn Antennas?'
   (e) What is the use of 'Antennas arrays'?
   (f) How Directivity measurement is done.
   (g) Explain about Duct propagation.
   (h) Define Critical frequency.
   (i) What do you understand by M-Curves
   (j) Explain about the structure of Ionosphere

PART – B (50 Marks)

SECTION – I

2. Prove that the radiation resistance of half wave dipole antenna is 73 ohm . [10M]

(OR)

3. Discuss in detail about the Far – Fields and patterns of thin Linear centre fed antennas of different lengths. [10M]

SECTION – II

4. What are 'Microstrip antennas'? Discuss in detail about its features, advantages and limitations. [10M]

(OR)

5. List out all the steps involved in design considerations of pyramidal Horns. [10M]

SECTION – III

6. Bring out the differences between Broadside arrays and Binomial arrays. Explain in detail about binomial array including radiation pattern. [10M]

(OR)

7. Discuss in detail, about Antenna Gain measurement with respect to various methods. [10M]

SECTION – IV

8. What is line of sight propagation? Elaborate LOS using neat labeled diagram and derive the expression for the same. [10M]

(OR)

9. With a neat diagram, explain in detail the principle involved in Tropospheric Propagation its advantages, limitations and applications. [10M]

SECTION – V

10. Enumerate the concept involved in "Multihop Propagation'. Also give its advantages and limitations. [10M]

(OR)

11. Discuss in detail about the Reflection of sky waves by Ionosphere virtual height and skip distance. [10M]

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Code No: R22A0412 **R22**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular Examinations, Model paper-II
(Electronics and Communication Engineering)
ANTENNAS AND WAVE PROPAGATION

Time: 3 hours **Max. Marks: 60**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 10 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(10Marks)

1.a) Determine the radiated power of antenna which has radiation resistance of 300 ohms and current of 5A.
b) What is antenna efficiency? How it is related with directivity.
c) Write the Fermat's Principle.
d) Mention the design Considerations of Pyramidal Horns.
e) What are the advantages and applications of microstrip antenna?
f) Write short notes on zoning.
g) Define point source.
h) List the precautions to be taken for error free antenna measurements.
i) Define skip distance.
j) Write the effect of Earth's Curvature on wave propagation.

PART - B

(50 Marks)

2. a) An antenna has a radiation resistance of 72 ohms, a loss resistance of 8 ohms and a power gain of 12 dB. Determine the antenna efficiency and directivity.
b) Compare the far field components of small loop and short dipole. [5+5]

OR

3. Elaborate the radiation mechanism of Quarter Wave Monopole and Half Wave Dipole antenna with current distribution characteristics. [10]

4. A pyramidal horn is having E-plane $a_E = 10\lambda$. The horn is fed by a rectangular waveguide with TE_{10} mode. Let $\delta = 0.2\lambda$ in the E-plane and 0.375λ in the H plane. Find (a) Length L, (b) E-Plane and H-plane flare angles, (c) H-plane aperture, (d) Half power beam width and directivity. [10]

OR

5. With neat diagram, elaborate the construction and working of Yagi-Uda antenna with its characteristics and what are the applications of it. [10]

6. Explain in detail the design aspects of microstrip antenna and also discuss why rectangular type is mostly used. What are the limitations of rectangular patch in microstrip antenna? [10]

OR

7. With relevant diagram, explain the operations of Flar Sheet and Corner Reflectors with different corner angles. [10]

8. a) With a neat example, elaborate the principle of pattern multiplication.
   b) How to design binomial array antennas? [5+5]

OR

9. Explain the atleast two antenna gain measurement methods with suitable block diagram. [10]

10. a) Elaborate on Sky wave propagation.
    b) What are the different effects of earth's curvature? [5+5]

OR

11. a) Write short notes in duct propagation.
    b) Explain the concepts of Multi-hop Propagation. [5+5]

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R22

Code No: R22A0412

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular Examinations, Model paper-III
(Electronics and Communication Engineering)
ANTENNAS AND WAVE PROPAGATION

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(10 Marks)

1.a) Define reciprocity theorem applicable to antennas.
b) A directional antenna requires to radiate 200W where as the isotropic antenna requires to radiate 2.6kW to produce the required power density at the receiver. Find the directive gain of directional antenna.
c) Derive the radiation characteristics of horn antenna.
d) Explain the tuning mechanism and bandwidth variation in Yagi Uda antenna.
e) Discuss about various types of microstrip antenna.
f) Differentiate deep dishes from the shallow dishes. List their relative merits and demerits.
g) What are the advantages of Binomial Array?
h) An EFA composed of $\lambda/2$ radiators with axis at right angles to the line of array required to have a power gain of 20. Determine the array length and width of major lobe between the nulls.
i) What is horizon? Differentiate between radio horizon and optical horizon.
j) Explain the mechanism by which waves are bent back by ionosphere layer with the aid of snells law.

PART - B

(50 Marks)

2.a) Define the effective length of a linear antenna for transmitting. Upon what factors does it depend?
b) Assume a sinusoidal current distribution on a centre fed thin straight half wave dipole. Derive the equations of all field components. [5+5]

OR

3.a) A thin dipole is $\lambda/15$ long. If it has a loss resistance of 1.5Ω calculate its
(i) Directivity (ii) Effective aperture area (iii) Beam solid angle
(iv) Radiation resistance (v) Gain
b) Derive the expressions for radiation fields of half wave dipole. Using these expressions find the total power radiated by it. [5+5]

4.a) Draw the sketch of Yagi Uda antenna and sketch the E-pane and H-lane radiation patterns.
b) Describe the current distribution and radiation pattern of a folded dipole antenna. Find the input impedance of folded dipole and explain why the antenna has higher bandwidth. [5+5]

OR

5.a) Derive the construction and basic principles of operation of a helical antenna under (i) Normal mode of operation (ii) axial mode of operation
b) A 10 turn right handed helical antenna has a diameter of 100 mm and 70 mm turn spacing. It is being operated at 1GHz. Find the HPBW, gain, polarization state. [5+5]

6.a) Explain the principle of operation of cassegrain feed with neat sketches.
b) Differentiate flat sheet and corner reflector antennas. [5+5]

OR

7.a) Explain the transmission model analysis of microstrip antenna.
b) Design a rectangular microstrip antenna using RT Duroid substrate with dielectric constant of 2.2, h=0.15cm so as to radiate at 10GHz. [5+5]

8.a) What is BSA? What are the conditions to achieve it? Derive the expression for directivity.
b) Consider a two element linear array. Derive the expression for electric field. Plot the radiation pattern by performing case study for different phase shift of currents fed to the elements. [5+5]

OR

9.a) Derive Friss transmission formula. Explain its importance in antenna measurement.
b) Describe various techniques for antenna gain measurement. [5+5]

10.a) Distinguish between ground wave propagation and ionospheric propagation.
b) Explain the following terms with diagrams (i)Duct propagation (ii) Skip zone. [5+5]

OR

11.a) Calculate the transmission path distance for an ionospheric transmission that utilize a layer of height 200km. The angle elevation of antenna beam is 20^0. Earth radius can be around 6370km.
b) Write a note on tropospheric propagation. [5+5]

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R22

Code No: R22A0412

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular Examinations, Model paper-IV
(Electronics and Communication Engineering)
ANTENNAS AND WAVE PROPAGATION

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(10 Marks)

1.a) What is quarter wave monopole?
b) Write the relation between effective aperture and Directivity.
c) Draw the structure of helical antenna with a coaxial line feed.
d) What is the spacing between elements of Yagi - Uda antenna
e) What are the disadvantages of lens antennas?
f) Write short notes on horn antenna.
g) What is the main disadvantage of binomial array?
h) Draw uniform linear array.
i) Derive the expression for refractive index of ionosphere.
j) Explain the concept of super refraction.

PART - B

(50 Marks)

2. a) Derive an expression for the radiation resistance of a Half wave dipole antenna.
b) What is meant by the effective area of an antenna? How is it related to the gain? [5+5]

OR

3. Discuss about loop antenna. What are the disadvantages of loop antenna? What are applications loop antennas? [10]

4. a) Write short notes on Yagi-Uda array Antenna and its applications, advantages and drawbacks.
b) Discuss different types of horn antennas with neat sketches. [7+3]

OR

5. With neat sketch, explain the operation of helical antenna. [10]

6. a) Explain the geometry of paraboloidal reflector with neat diagram.
b) Calculate the 3dB beam width and power gain of a parabolic antenna at a frequency of 1.6GHz with 2.4 meter diameter and 48% antenna efficiency? [6+4]

OR

7.a) Compare UHF and VHF antennas.
b) What are the various feeds used in reflectors? [7+3]

8.a) Discuss broadside array and end fire array with neat diagrams.
b) Derive expression for antenna array factor. [7+3]

OR

9.a) An end fire array consisting of several half wave length long isotropic radiators having directive gain of 30. Find the length of array for broad side antenna?
b) A broadside array of identical antennas consists 8 isotropic radiators separated by distance $\lambda/2$. Find radiation field in a plane containing the line of array showing directions of maxima and null. [7+3]

10. Briefly describe the following terms connected with sky-wave propagation:
a) Virtual height
b) Critical frequency
c) Maximum usable frequency
d) Skip distance. [10]

OR

11.a) Describe the troposphere and explain how ducts can be used for microwave Propagation.
b) Write a short note on Multi-hop propagation. [6+4]

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R22

Code No: R22A0412

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular Examinations, Model paper-V
(Electronics and Communication Engineering)
ANTENNAS AND WAVE PROPAGATION

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(10 Marks)

1.a) Define an antenna and mention the necessity of antenna. [1]
b) How the radiation is accomplished in a two wire antenna? [1]
c) Mention the advantages of folded dipole. [1]
d) While measuring the gain of horn antenna the gain oscillator was set for 9 GHz frequency and attenuation inserted was found to be 9.8 dB. Calculate the gain of horn. The distance between the two horn was 35cm. [1]
e) Estimate the diameter of a paraboloidal reflector required to produce a beam of 5^0 width at 1.2 GHz. [1]
f) What are the merits and demerits of lens antenna? [1]
g) Calculate the directivity of given linear end fire, uniform array of 10 elements with a separation of $\lambda/4$ between the elements. [1]
h) Describe the principle of end-fire array. [1]
i) Find the maximum range of tropospheric for which the transmitting antenna height is 100 ft and receiving antenna height is 50 ft. [1]
j) Briefly explain about D-region. [1]

PART - B

(50 Marks)

2. Explain the following terms with proper expressions.
a) Directivity
b) Field pattern
c) Half power beam width
d) Beam efficiency. [10]

OR

3. a) State and prove Frii's transmission formula.
b) With the help of Maxwell's equation, explain how the radiation and reception of EM waves takes place. [5+5]

4. Describe about the following:
a) Folded – dipole antenna
b) Yagi-uda antenna. [5+5]

OR

5. a) Find length L, H plane aperture and flare angles θ_E and θ_H of a pyramidal horn for which E plane aperture is 10 λ. Horn is fed by a rectangular waveguide with TE_{10} mode. Assume $\delta = 0.2\ \lambda$ in E plane and $0.375\ \lambda$ in H plane. Also find E plane and H plane beam widths and directivity.

b) Write short notes on helical antenna. [4+6]

6.a) Describe in detail about the cassegrain method of feeding a paraboloid reflector, with the help of the geometry of this feeding arrangement.

b) Explain briefly about features of microstrip antennas. [6+4]

OR

7. a) Compare the performance of parabolic reflector and corner reflector.

b) Explain zoning in lens antenna. [7+3]

8. What is broadside array? Draw the pattern. Obtain the expressions for directions of peaks, nulls, sidelobes and BWFN. [10]

OR

9. a) Explain the method of measuring impedance of an antenna.

b) Calculate the directivity of an antenna, which has half power beam widths of 60^0 and 75^0 in vertical and horizontal planes respectively. [7+3]

10. Explain in brief about the following terms with respect to wave propagation

a) Critical frequency

b) MUF

c) Skip distance

d) Virtual height. [10]

OR

11.a) Discuss the salient features of ground wave propagation.

b) Calculate the wave tilt in degrees of the surface wave over an earth of 6mm conductivity and relative permittivity of 12 at 2 MHz. [5+5]

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R22

Code No: R22A0412

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular Examinations, Model paper-VI
(Electronics and Communication Engineering)
ANTENNAS AND WAVE PROPAGATION

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(10 Marks)

1.a) An antenna has a field pattern given by $E(\theta) = \cos^2\theta$ for $0^0 \leq \theta \leq 90^0$. Find the half power beam width.
b) Define any three antenna parameters.
c) What is folded dipole antenna?
d) Why is an electromagnetic horn antenna a well matched antenna?
e) What is Fermat's principle?
f) List the advantages of Cassegrain feed.
g) Find the near and far field distances for a reflector antenna with diameter D = 0.5m at 300 GHz.
h) Draw the radiation pattern of an array of four isotropic elements spaced by $\lambda/2$.
i) What is impact of imperfect earth on surface wave?
j) Calculate the maximum distance at which signal from transmitting antenna with 144 m height would be received by the receiving antenna of 25m height.

PART - B

(50 Marks)

2.a) Derive the Friis transmission equation and discuss the terms isotropic, omni-directional and principal patterns.
b) A short antenna with a uniform current distribution in free space has Idl = 3×10^{-4} A-m. Calculate the far field E_θ component for $\theta = 90^0$, $\Phi = 0^0$, $\lambda = 10$ cm and r = 200 cm. [5+5]

OR

3.a) Derive the expression for power radiated and radiation resistance of alternating current element.
b) A 50cm long vertical dipole operating at 30MHz radiates a maximum electric field of 15 mV/m at 5 km distance. Find its power radiated, input current and maximum magnetic field at the same distance. [5+5]

4.a) Explain the design considerations of Pyramidal Horns.
b) Sketch the geometry of a helical antenna, and explain the principle of working in normal mode. [5+5]

OR

5.a) How a Rhombic antenna has high directivity? Explain by means of its geometrical structure.
b) Draw the structure of helical antenna and explain its working in axial mode. [5+5]

6.a) Compare different feeding methods that are associated with parabolic reflectors.

b) For a parabolic reflector of 7.5m diameter at 4 GHz, find the BWFN, HPBW, Directivity and effective aperture. [5+5]

OR

7.a) With neat schematic, describe the radiation characteristics of a rectangular microstrip patch antenna, using basic transmission line model.

b) Calculate and plot the pattern of an ideal square-corner reflector with $\lambda/2$ driven antenna spaced $\lambda/2$ from the corner but with the antenna displaced 20^0 from the bisector of the corner angle. The pattern to be calculated is in a plane perpendicular to the antenna and to the reflecting sides. [5+5]

8.a) Find the array factor and sketch the pattern of a 2 element array having equal amplitudes, phases, and having a spacing of $d = \lambda$.

b) How do you measure gain of an antenna using three antennas? [5+5]

OR

9.a) Obtain an expression for the BWFN of a broadside array, and compare the same with that of an End fire array.

b) What are the advantages of antenna arrays? Explain the types of antenna arrays. [5+5]

10. a) Obtain the relation between skip distance and Maximum Usable Frequency.

b) Explain the effects of D and F layers of the ionosphere on propagation and estimate the critical frequency and MUF for a layer with $10^{11}/m^3$ electron density, and incident angle of 60^0. [5+5]

OR

11. Write short notes on the following:

a) Duct propagation

b) Fading. [5+5]

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R22

Code No: **R22A0413**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-1

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 10 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

****

PART – A (10 Marks)

1.

(a) Define linear shift invariant system. **(1M)**

(b) Check the system y(x) = x(n/2) is stable or not. **(1M)**

(c) State the difference between DITFFT and DIFFFT algorithms. **(1M)**

(d) Determine the IDFT of X(k) = { 3, (2+j), 1, (2-j)}. **(1M)**

(e) Using Bilinear transformation, find H (z) from H (s) = 2 / [(S+1) (S-1)] with T = 1 sec. **(1M)**

(f) Determine the order of the LPF for Butterworth approximate, with 3 dB attenuation at 500 Hz and an attenuation of 40 dB at 1000 Hz**. (1M)**

(g) What are finite word-length effects**? (1M)**

(h) What are the conditions for a FIR system to have linear phase? **(1M)**

(i) What are the applications of Digital signal processor**? (1M)**

(j) What is the advantage of very large instruction word architecture in Digital signal Processor. **(1M)**

PART – B (50 Marks)

SECTION – I

2. Check for the linearity and time invariant of the following systems **(10M)**

(i) $y(n) = x(n)\, x(n-2)$

(ii) $y(n) = a^n u(n)$

(OR)

3. Determine and sketch the magnitude and Phase response of the given system

$y(n) = 1/3 [x(n) + x(n-1) + x(n-2)]$ **(10M)**

SECTION – II

4. Determine the IFFT using DIF method for X(K) = { 1, 1+j, -j2, 1, 0, j2, 1+j } **(10M)**

(OR)

5. Find the DFT of the Sequence x(n) defined by **(10M)**

$x(n) = 1$ for $2 \le n \le 6$

$= 0$ for $n = 0, 1$ and 7.

Use DIF algorithm. Give all intermediate results.

SECTION – III

6. Design a Chebyshev IIR digital low pass filter to satisfy the constraints using bilinear transformation method and assuming T= 1s.

$$0.707 \leq |H(\omega)| \leq 1 ; \quad 0 \leq \omega \leq 0.2\pi$$
$$|H(\omega)| \leq 0.1 ; \quad 0.5\pi \leq \omega \leq \pi$$ **(10M)**

(OR)

7. Design a Butterworth IIR low pass filter with the following specifications: pass band Ripple α_p =1 dB, stop band attenuation α_s =40 dB, pass band edge frequency is 2 KHz, stop band edge frequency 10 KHz, Sampling frequency is 25 KHz. Use the bilinear transformation technique. **(10M)**

SECTION – IV

8. Design a FIR high pass filter of length 11 to approximate the ideal filter with a pass band cut off frequency at 1 KHz. Use triangular window. **(10M)**

(OR)

9. Differentiate between IIR and FIR filters. Discuss the various steps in designing FIR filter. **(10M)**

SECTION – V

10. a. Explain the spectrum of down sampling. **(5M)**
    b. What are the applications of multi rate digital signal processing? **(5M)**

(OR)

11. Write short notes on **(5M)**
    (i) Methods to prevent overflow.
    (ii) Up sampling, Interpolation and the concept of decimation. **(5M)**

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R22

Code No: R22A0413

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-2

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

****

PART – A (10 Marks)

1.

(a) Define causal system and also linear system. **(1M)**
(b) Write the Z-transform of the sequence X(n) = [3,8,2,1,-1,4]. **(1M)**
(c) Find the IDFT of X(K) = {1,1,1,1}. **(1M)**
(d) What are the differences and similarities between DIF and DIT algorithms? **(1M)**
(e) What are the properties of Bilinear Transformations? **(1M)**
(f) Why impulse invariant method is not preferred in the design of IIR filter other than the low pass filter? **(1M)**
(g) Write the important features of IIR filters. **(1M)**
(h) Mention 4 advantages of FIR filter. **(1M)**
(i) State sampling theorem. **(1M)**
(j) What is decimation? When it is performed? **(1M)**

PART – B (50 Marks)

SECTION – I

2. a. Check for the stability and Causality of the following systems. **(5M)**

(i) $h(n) = x(n-1)$ (ii) $h(n) = n^2 x(-n)$

b. Determine and sketch the magnitude and phase response of the given system **(5M)**

$y(n) = 1/2 [x(n) + x(n-1)]$

(OR)

3. Describe the digital signal processing system. **(10M)**

SECTION – II

4. Determine the IFFT using DIT method for X(k) = { 4,-6, 8, -10, 12, -3, 2, -1} **(10M)**

(OR)

5. Find the 8-point DFT of the following Sequences by using DIT FFT algorithm: **(10M)**

x(n) = {1,1,1,1,0,0,0,0}

SECTION – III

6. Design a digital low pass IIR Chebysher filter for pass band cut off frequency of 1500 Hz, stop band cut off frequency of 7500 Hz, Attenuation in pass band 3 dB and attenuation in stop band 15dB. Assume suitable sampling frequency? Use Bilinear transformation. **(10M)**

(OR)

7. Design a Butterworth low pass filter for the specifications given below:
   i) -3dB cut off frequency of 100 rad / sec.
   ii) -25 dB cut off frequency of 250 rad / sec. **(2*5=10)**

SECTION – IV

8. Determine the order of low pass digital FIR filter using an appropriate window function for the following specifications:

Pass band cut off frequency fp = 150Hz, Stop band frequency fs= 250 Hz. Pass band ripple Ap = 0.1 dB Stop band attenuation As = 40dB Sampling frequency F = 100 Hz.

Also give the design procedure for the above problem**. (10M)**

(OR)

9. (i) Compare IIR and FIR filters **(6M)**

(ii) What is an aliasing effect **(4M)**

SECTION – V

10. a. Explain the interpolation process. How it is different from Decimation?**(5M)**

b. How do you change the sampling rate by arbitrary factor? **(5M)**

(OR)

11. Write short notes on

(i) Explain the application of multirate signal processing **(6M)**

(ii) Comparison between DSP and other microprocessor architectures. **(4M)**

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Code No: R22A0413 **R22**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-3

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

1). a	State the conditions for a system to be stable and causal.	**[1M]**
b	Check whether or not the system y(n) = T [x(n)] = x (-n) is time-invariant.	**[1M]**
c	Find the DFT if the sequence x(n) = [1 0 -1 1]	**[1M]**
d	Why FFT is preferred to DFT?	**[1M]**
e	Why impulse invariant method is not preferred in the design of IIR filter other than low pass filter?	**[1M]**
f	What are the properties of bilinear transformation?	**[1M]**
g	Distinguish between FIR and IIR filters.	**[1M]**
h	Give the expression for the frequency response of Hamming window and Hanning window.	**[1M]**
i	Explain the meaning of Interpolation.	**[1M]**
j	Give 1 applications of Multi Rate Signal Processing.	**[1M]**

PART-B (50 MARKS)

SECTION-I

1. a.	Check for the stability and causality of the following systems: (i) $H(n) = x(n^1)$ (ii) $h(n) = x(-n)$	**[10M]**
b.	Find the system's response to the input $x(n) = \{1/1)^n .u(n)$ with zero initial conditions $y(n) = ¾\ y(n-1) – 1/8\ y\ (n-1) + x(n) – x(n-1)$	
	OR	
3. a.	Verify the system $y(n) = 1 / [x(n) + 3]$ for its linearity time invariance, causality and stability.	**[10M]**
b.	Obtain the frequency response of the system; $Y(n) = -1y(n-1) + 3\ y\ (n-1) + 4\ x(n)$ and plot.	

SECTION-II

4	Determine IFFT using DIT method for X(k) = {4, -6, 8, -10, 11, -3, 1, -1}	**[10M]**
	OR	
5	Find the 8 point DFT of the following sequences using DIT FFT: (i) x(n) = {1, 1, 1, 1, 0, 0, 0,0} (ii) x(n) = {1, 1, 1, 1)	**[10M]**

SECTION-III

6 Design a Butterworth filter satisfying the constraints using bilinear transformation: **[10M]**

$0.75 \leq |H(e^{j\omega})| \leq 1 \qquad 0 \leq \omega \leq \pi / 1$

$|H(e^{j\omega})| \leq 0.1 \qquad 3\pi/4 \leq \omega \leq \pi.$

OR

7 Design a Butterworth IIR low pass filter with the following specifications: Pass band ripple α_p = 1 dB, stop band attenuation α_s = 40dB, pass band edge frequency is 1000Hz, stop band edge frequency is 10000Hz and sampling frequency is 15000Hz, using bilinear transformation technique. **[10M]**

SECTION-IV

8 The designed response of a certain FIR filter is given by: **[10M]**

$H_d(f) = \{ 1 \quad 0 \leq f \leq 1$ KHz

$\{ 0 \quad f > 1$ KHz.

Let the sampling rate be f_s = 10 KHz. Impulse response is of 1 milli-sec duration. Use Hamming window and compute the impulse response of FIR filter.

OR

9 Design an ideal LPF, whose response is **[10M]**

$H_d(e^{jw}) = e^{j3w} \quad 0 \leq \omega \leq \pi / 3$

$= 0$ otherwise.

Using a rectangular window, N=5

SECTION-V

10 a. Derive and draw the spectrum of a down sampler used in decimator. **[5M]**

b. State and prove identities used in Multirate signal processing related to decimator. **[5M]**

OR

11 a. What are the advantages of Multi-rate signal processing? **[5M]**

b. What are the two basic operations in Multi-rate signal processing? **[5M]**

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R22

Code No: R22A0413

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-4

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks:60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

1). a	What are advantages and disadvantages of DSP?	**[1M]**
b	Explain about linearity and time invariance of a system.	**[1M]**
c	What are differences between DIT FFT and DIF FFT	**[1M]**
d	Find the DFT of x[n] = {1,1,0,0}.	**[1M]**
e	What are the disadvantages of impulse invariant method.	**[1M]**
f	What are the important features of IIR filters?	**[1M]**
g	Write the advantages of FIR filters.	**[1M]**
h	Define Linear phase system.	**[1M]**
i	What is multi rate signal processing?	**[1M]**
j	What is interpolation?	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	Check the linearity and time invariance of the following system $Y(n)= Ax^2(n)+B$ ii) $y(n)=n\,x(2n)$	**[10M]**
	OR	
3	For the given system $y(n)=x(n)-2x(n-1)+x(n-2)$, determine the magnitude and phase response.	**[10M]**

SECTION-II

4	Find the DFT of a sequence x[n]={1,1,1,1,1,0,0,0} using DIT FFT algorithm	**[10M]**
	OR	
5	Compute 8-point DFT of the sequence $x[n]= 1;\ 0\leq n \leq 7$ $=0$ otherwise by using DIF algorithm.	**[10M]**

SECTION-III

6	Design a Chebyshev filter with α_p=2.5dB, Ω_p=20 rad/sec, α_s=30dB, Ω_s=50rad/sec.	**[10M]**
	OR	
7	Using the Bilinear transform, design a high pass filter monotonic in pass band with cut off frequency of 1000Hz and down 10dB at 350Hz. The sampling frequency is 5000Hz.	**[10M]**

SECTION-IV

8 Compare IIR and FIR filters and discuss the various steps in designing FIR filter **[10M]**

OR

9 Design an ideal low pass filter with frequency response **[10M]**

$H_d(e^{jw})= 1$ for $-\pi/2 \leq w \leq \pi/2$

$= 0$ for $\pi/2 \leq |w| \leq \pi$, find the values of h(n) for N=11,find H(z)

SECTION-V

10 a) Explain the spectrum of down sampling. **[5M]**

b) Write the applications of multi rate signal processing. **[5M]**

OR

11 a) Explain about anti-aliasing filter. **[5M]**

b) Explain about sampling rate conversion **[5M]**

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R15

Code No: R22A0413

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-5

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question From each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

1). a	List the applications of Z – transform?	**[1M]**
b	Discuss the concept of stability and causality with examples.	**[1M]**
c	What is zero padding? Why it is needed?	**[1M]**
d	Differentiate between Over-Lap save and Over-Lap Add method.	**[1M]**
e	Give any two properties of Butterworth low pass filter.	**[1M]**
f	What are the advantages and disadvantages of bilinear transformation?	**[1M]**
g	What are the properties of IIR filters?	**[1M]**
h	Describe the desirable characteristics of window?	**[1M]**
i	Why does the limit cycle problem not exist when FIR digital filter is realized in direct form?	**[1M]**
j	Discuss the applications of multi-rate signal processing.	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	Find the digital network in direct and transposed form for system described by the difference equation. $y(n) = x(n) – 0.3\ x(n - 1) - 0.7\ x(n - 2) + 0.6\ y(n - 1) + 0.8\ y(n – 2)$	**[10M]**
	OR	
3	Explain in detail the Frequency Response of Stable Systems.	**[10M]**

SECTION-II

4	Explain Radix- 2 Decimation- in-Frequency FFT algorithms.	**[10M]**
	OR	
5	Perform circular convolution of the following sequences using DFT and IDFT: $x_1(n) = \{1, 2, 1, 2\}$ and $x_2(n) = \{4, 3, 2, 1\}$	**[10M]**

SECTION-III

6	Explain the procedure for designing Analog filters using the Chebyshev approximation.	**[10M]**
	OR	
7	a). Write the transfer function of unnormalized Butterworth low pass filter. b). Discuss the digital frequency transformation.	**[5M]** **[5M]**

SECTION-IV

8	Design a FIR digital low-pass filter with a cut off frequency of 1 kHz and a sampling rate of 4 kHz with 7 samples using Fourier series method.	**[10M]**
	OR	
9	Explain the finite word length effects in FIR digital filters.	**[10M]**

SECTION-V

10	Explain the effect of aliasing in decimation with the frequency spectrum and discuss how the aliasing can be eliminated.	**[10M]**
	OR	
11	Explain the application of sampling rate conversion in sub-band coding.	**[10M]**

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Code No: R22A0413

R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-6

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A (10 Marks)

1). a	Discuss the stability criterion for digital filter.	**[1M]**
b	What are the conditions for causality of an LSI system?	**[1M]**
c	How FFT is more efficient to determine DFT of sequence?	**[1M]**
d	Find the IDFT of X(k) = {1, 2, 3, 4}	**[1M]**
e	Explain about impulse invariant technique.	**[1M]**
f	Why is the Butterworth response called a maximally flat response?	**[1M]**
g	What is warping effect?	**[1M]**
h	Write the characteristics features of rectangular window.	**[1M]**
i	Define multi-rate signal processing and where it is used?	**[1M]**
j	What is the need for anti-aliasing filter prior to down sampling?	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	a) How are discrete time signals classified? Differentiate between them.	**[5M]**
	b) Find the linear, invariance and causality of given system: $y(n) = x(n) – ax(n - 1)$	**[5M]**
	OR	
3	a)Explain in detail the Frequency Response of Stable Systems.	**[5M]**
	b)Write the differences between Direct Form-I &II	**[5M]**

SECTION-II

4	Define DFT and then state and prove any two properties of DFT.	**[10M]**
	OR	
5	With an appropriate example compare overlap-save method and overlap-add method.	**[10M]**

SECTION-III

6	a)For the analog transfer function $H(s) = 2/\{(s+2)(s+3)\}$. Determine H (z) using bilinear transform method. Assume T = 1 sec.	**[6M]**
	b) Compare Butterworth and Chebyshev filters	**[4M]**

OR

7	Explain the procedure for designing Analog filters using the Chebyshev approximation.	**[10M]**

SECTION-IV

8	Design a FIR digital low-pass filter with a cutoff frequency of 1 kHz and a sampling rate of 4 kHz with 7 samples using rectangular window.	**[10M]**

OR

9	Design a low pass filter using Hamming window with a cutoff frequency of 0.9 radians/sec and N=5..	**[10M]**

SECTION-V

10	a)Discuss the sampling rate conversion with the help of a neat block diagram.	**[6M]**
	b) Write the applications of multi rate signal processing.	**[4M]**

OR

11	a)Give the frequency domain description of up-sampler.	**[5M]**
	b)Explain down sampler with neat block diagram.	**[5M]**

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Code No: R22A0413 **R22**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-7

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

1). a	Test the given systems y(n)=nx2(n) and y(n)=x(n)+x(n-1) are Shift Invariant or not?	**[1M]**
b	Difference between Energy and Power of discrete time signals.	**[1M]**
c	Draw the Butterfly diagram for 4 point DIT FFT.	**[1M]**
d	Compare the computational complexity of FFT and DFT.	**[1M]**
e	In what way Chebyshev filter is different from butterworth filter.	**[1M]**
f	Write the difference between FIR and IIR	**[1M]**
g	List out the types of structures used to realize FIR systems	**[1M]**
h	Distinguish analog and digital filters.	**[1M]**
i	Define interpolation and write the input output relationship for an interpolator	**[1M]**
j	What is meant by multistage approach to sample rate conversion?	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	For the given systems y[n] = x[-n], y[n] = x[-n+2], y(n)=cos[x(n)] verify the concepts of static or dynamic, linear or non-linear, and causal or non-causal.	**[10M]**
3	a. Find the impulse response of the system $y(n) - y(n-1) = x(n) + x(n-1)$. b. Find Z – Transform of $x(n) = -a^n u(-n-1)$ and sketch its ROC in Z plane?	**[10M]**

SECTION-II

4	State and prove any three properties of DFT.	**[10M]**
	OR	
5	Determine DFT of a given sequence x(n)={1,1,0,0} and find the IDFT for Y(K)={1,0,1,0}.	**[10M]**

SECTION-III

6	List out the steps involved and convert the analog filter with system function $H(s) = \frac{2s}{s^2 + 3s + 4}$ into a digital filter using Bilinear transformation. Take T=1s	**[10M]**
	OR	
7	Design a digital butterworth filter to meet the following specifications:	**[10M]**

Attenuation is 3db(max) upto 0.2π and Attenuation is 10db min above 0.35 π. Use Bilinear transformation.

SECTION-IV

8 Design a FIR symmetric 7 tap filter to have a cutoff frequency fc=0.2 π rad/sec. Use Hamming window. **[10M]**

OR

9 Compare the various window functions and Obtain FIR linear-phase, direct form realization of the system function $H(z)=1+2z^{-1}+3z^{-2}+4z^{-3}+3z^{-4}+2z^{-5}+z^{-6}$ **[10M]**

SECTION-V

10 Discuss the process of Interpolation by a factor I with examples and also give the applications of MultiMate signal processing. **[10M]**

OR

11 Describe the Decimation process and determine Y(2n) for the discrete sequence Y(n)={1,2,3,4,5,6,7,8,9}. Derive the spectrum of a down sampled signal. **[10M]**

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Code No: R22A0413

R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-8

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

1). a	List the difference between Linear and Circular convolution and the applications of these?	**[1M]**
b	Briefly explain about discrete exponential and sinusoidal sequences.	**[1M]**
c	For x(n)={1,2,-3,0,1,-1,4,2} Determine X(0)	**[1M]**
d	Draw the Butterfly diagram for 4 point DIF FFT.	**[1M]**
e	Bring out the differences between Impulse invariant and Bilinear Transformation techniques.	**[1M]**
f	Write the principle of Bilinear Transformation to design IIR Filter.	**[1M]**
g	Why FIR filters are always stable, explain?	**[1M]**
h	Compare various window functions.	**[1M]**
i	How can sampling rate be converted by a factor I/D?	**[1M]**
j	Explain the need of sample rate conversion.	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	The output y(n) for an LSI system with the input x(n) is given by y(n)=x(n)-2x(n-1)+x(n-2). Compute & sketch magnitude and phase response of the system for $\|w\| \leq \Pi$	**[10M]**
	OR	
3	a. Obtain Direct form-1 realization for the system y(n)=-0.1y(n-1)+0.72y(n-2)+0.7x(n)-0.25x(n-2).	**[5M]**
	b. Realize H(z) using Direct form-II $H(z) = [0.7-0.252\ z^{-2}] / [1+0.1z^{-1}- 0.72z^{-2}]$	**[5M]**

SECTION-II

4	Determine the convolution between the sequences $x_1(n)$ = {1,2,3,4} and $x_2(n)$= {4,3,2,1} using DFT.	**[10M]**
	OR	
5	By applying DIF FFT and DIT FFT algorithms determine DFT of the given sequence x(n) = {1,2,3,4}.	**[10M]**

SECTION-III

6	Design a Digital LPF is expected to meet the specifications with sampling	**[10M]**

frequency of 200 KHz, Pass band Ripple = -2 dB, Pass band Edge frequency = 5KHz, Stop band Ripple = - 40 dB, Stop band Edge frequency = 100 KHz Using bilinear transformation method using butter worth approximation?

OR

7 Explain Impulse Invariance method of deriving IIR digital filter from corresponding analog filter. **[10M]**

SECTION-IV

8 Design a Low pass filter using Rectangular window by taking 9 samples of w(n) with cut-off sequence of 1.2 radians/sec, also draw the filter using Direct form. **[10M]**

OR

9 Design a low pass filter for a seven stage with cutoff frequency at 300 Hz if Ts=1 msec. Use hanning window. **[10M]**

SECTION-V

10 Discuss the process of Decimation by a factor L with a neat block diagram, example and also give few applications of multirate signal processing. **[10M]**

OR

11 a. Explain the role design of Low pass filter used in sampling rate conversion. **[5M]**

b. Explain the block schematic representation of Sampling Rate conversion by a rational factor I/D. **[5M]**

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R22

Code No: R22A0413

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester MODEL PAPER-9

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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			BCLL	CO(s)	Marks
		PART-A (10 Marks)			
		(Write all answers of this part at one place)			
1	A	Distinguish circular and Linear convolution	**L2**	**CO-I**	**[1M]**
	B	Difference between Direct form I and Direct form II realizations.	**L2**	**CO-I**	**[1M]**
	C	What is the need of FFT algorithm?	**L1**	**CO-II**	**[1M]**
	D	Give computational efficiency of FFT over DFT.	**L2**	**CO-II**	**[1M]**
	E	Mention analog to digital frequency relation in bilinear transformation.	**L1**	**CO-III**	**[1M]**
	F	Distinguish Chebyshev Type I and Type II filters,	**L2**	**CO-III**	**[1M]**
	G	Define Phase Delay.	**L1**	**CO-IV**	**[1M]**
	H	Explain Gibbs Phenomenon.	**L1**	**CO-IV**	**[1M]**
	I	Mention any two applications of multirate signal processing	**L1**	**CO-V**	**[1M]**
	J	If x(n)=[1, 2, 3], what is the signal after interpolation by a factor 3.	**L2**	**CO-V**	**[1M]**
		PART-B (50 Marks)			
		SECTION-I			
2	A	Define stability and causality of a time invariant system and prove the stability condition	**L2**	**CO-I**	**[5M]**
	B	Find the natural response of the system modeled by Linear Constant Coefficient Difference Equation:y(n)+2y(n-1)=x(n)+x(n-1) with initial conditions y(-1)=y(-2)=1.	**L5**	**CO-I**	**[5M]**
		OR			
3	A	The system is represented by the difference equation: y(n) = x(n+1) + 3x(n) + 5x(n-1) Is the system causal, stable, memoryless and time invariant? Justify your answer	**L4**	**CO-I**	**[5M]**
	B	Synthesize Direct form-I realizations of system described by the difference equation , y(n) = x(n) - x(n-1) + x(n-3).	**L3**	**CO-I**	**[5M]**
		SECTION-II			
4		Compute the DFT of the sequence of 8-point using DIT-FFT radix 2 algorithm for x(n) ={1, 1, 1, 1, 1, 1, 1, 1} draw the flow diagram neatly.	**L3**	**CO-II**	**[10M]**

OR

5	A	Explain the inverse FFT algorithm to compute inverse DFT of a N=8. Draw the flow graph for the same.	**L2**	**CO-II**	**[5M]**
	B	Distinguish difference between DTFS, DTFT, DFS and DFT.	**L4**	**CO-II**	**[5M]**

SECTION-III

6	A	Derive the frequency mapping expression for bilinear transformation. And explain stability of system with neat sketch of s-plane to z-plane.	**L4**	**CO-III**	**[5M]**
	B	Convert analog filter with transfer function (s + 0.1) / [(s + 0.1)^2 + 9] into a digital IIR filter using bilinear transformation. The digital filter should have a resonant frequency of $W_r = \prod/4$.	**L3**	**CO-III**	**[5M]**

OR

7		For the given specifications αp = 3 dB; αs = 15 dB, Ωp = 1000 rad/sec. Design a high pass fitter using Butterworth approximation	**L6**	**CO-III**	**[10M]**

SECTION-IV

8	A	Design an ideal high pass filter using Hamming window with the desired frequency response. $H_d(e^{j\omega}) = \begin{cases} 1 & for \quad \pi/4 \le \lvert\omega\rvert \le \pi \\ 0 & otherwise \end{cases}$ Find h(n) for N=11.	**L6**	**CO-IV**	**[6M]**
	B	Distinguish advantages and disadvantages of FIR and IIR filters.	**L4**	**CO-IV**	**[4M]**

OR

9	A	Give the expression for rectangular window function. Find its frequency response and also sketch its spectrum. Also discuss its features.	**L2**	**CO-IV**	**[5M]**
	B	Derive an expression for frequency response of Linear phase FIR filter when impulse response is symmetry having N odd no. of samples.	**L4**	**CO-IV**	**[5M]**

SECTION-V

10	A	What is aliasing ? What is the need for anti- aliasing filter prior to down sampling.	**L2**	**CO-V**	**[5M]**
	B	Consider a signal x(n) = u(n) i. Obtain a signal with a decimation factor `3' ii. Obtain a signal with a interpolation factor `3'.	**L5**	**CO-V**	**[5M]**

OR

11	A	Describe the decimation process with a factor of `M '. Obtain necessary expression, sketch frequency response. Also discuss aliasing effect.	**L4**	**CO-V**	**[5M]**
	B	With the help of block diagram explain the sampling rate conversion by a rational factor `I/D'. Obtain necessary expressions.	**L4**	**CO-V**	**[5M]**

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