DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

QUESTION BANK

FOR

IV B.TECH II SEMESTER
(2018 – 19)

INDEX

S.NO	NAME OF THE SUBJECT
1	RADAR SYSTEMS
2	WIRELESS COMMUNICATIONS & NETWORKS

MODEL PAPER –I   R15

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech II Semester Examinations
RADAR SYSTEMS
(Electronics & Communication Engineering)

Time: 3 hours   **Max. Marks: 75marks**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and all questions are to be answered .
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer all FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART A   (25 Marks)

1.

a) Radar angular measurements are referenced to true north and local horizontal plane. With reference to them
   Define Azimuth and Elevation angles and their ranges.   [2M]
b) Define the term radar range resolution and write the equation.   [3M]
c) Describe the Doppler Effect.   [2M]
d) Establish a relation between Doppler frequency shift and radial velocity of a moving target. [3M]
e) Define MTI radars.   [2M]
f) What are Range gate Doppler filters?   [3M]
g) List out and describe the basic methods of scanning.   [2M]
h) What is Squint angle?   [3M]
i) What is a matched filter Receiver?   [2M]
j) Write the equation for Noise figure.   [3M]

Part B   50 Marks

2. Derive the simple radar range equation in terms of minimum detectable signal to noise ratio $(S/N)_{min}$ and
   explain why $(S/N)_{min}$ is a better measure of a radar detection than the minimum detectable signal (S_{min}).

(OR)

3. Explain the Radar Cross Section (RCS) of sphere and cone-sphere targets.

4. Explain the principle of operation of CW Doppler radar with non zero IF receiver.

(OR)

5. Explain how range and Doppler measurements are performed using FM CW radar.

6. (a) Explain the principle of operation of MTI radar with power oscillator transmitter with
       a neat block diagram.
   (b) Discuss about blind speeds.

(OR)

7. What are Delay line cancellers and explain their filter characteristics?

8. Explain the operation of a two-coordinate Amplitude comparison mono pulse Tacking Radar.

(OR)

9. Write the differences between conical and mono pulse Tracking Radars.

10. (a) What is a matched filter receiver? Derive its frequency response function.

    (b) Describe the operation of matched filter with non white noise.

(OR)

11. Explain the following:

      i)   Branch type duplexer

      ii)   Balanced type duplexer

MODEL PAPER –II

R15

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech II Semester Examinations
RADAR SYSTEMS
(Electronics & Communication Engineering)

Time: 3 hours   Max. Marks: 75marks

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Part A is compulsory which carriers 25 marks and Answer all questions.
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PART A   (25 Marks)

1.

a) Explain the importance of Radar Pulse repetition frequency in determining the minimum range of radar.   [2M]

b) List out some important applications of a radar system.   [3M]

c) If the transmitting source is fixed and the radar target is approaching the source, What type of change the received frequency will undergo?   [2M]

d) Why isolation between Transmitter and Receiver is required in CW Radar?   [3M]

e) Define pulse Doppler radars   [2M]

f) What is Butter fly effect?   [3M]

g) What is sequential Lobing?   [2M]

h) Explain Boxcar Generator in conical Scanning?   [3M]

i) Define Noise Temperature and give it's relationship with Noise figure.   [2M]

j) Explain what is a A scope display   [3M]

Part B   50 Marks

2. Write explanatory notes on:
   i)   Minimum detectable signal
   ii)   False alarm
   iii)   Missed detection.

(OR)

3. Derive the maximum range for a radar system from first principles. Explain the applications of radar.

4. Define Doppler effect. Explain how it is used in CW radar.

(OR)

5. Explain the principle of operation of FMCW altimeter with suitable diagram.

6. Explain the concept of staggered PRFs in MTI radar.

(OR)

7. Draw the block diagram of MTI radar using range gates and filters and explain each block.

8. Explain the operation of amplitude comparison monopulse tracking radar with the help of a block diagram.

(OR)

9. Explain in detail about limitations to tracking accuracy.

10. a) Derive the matched filter characteristic.
    b) Discuss about efficiency of non-matched filters.

(OR)

11. a) Write short notes on various displays.
    b) Explain the operation of branch type duplexer with neat sketch.

R15

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<div align="center">

PART A   **(25 Marks)**

</div>

1.

a) Explain the relation between Pulse Repetition period and Pulse Repetition frequency in a Radar System.
                                                                                        [2M]

b) Define Unambiguous range in a radar system.   [3M]

c) Write the applications of CW Radar   [2M]

d) What is the principle of FM Radar?   [3M]

e) What is a delay line canceller?   [2M]

f) Explain Staggered PRFs.   [3M]

g) What is conical scanning?   [2M]

h) What is Amplitude Comparison monopulse?   [3M]

i) Give an expression for the effective Noise temperature of N cascaded stages   [2M]

j) Explain what is a PPI display   [3M]

<div align="center">

Part B   **50 Marks**

</div>

2. Write explanatory notes on:
    i)   Receiver noise
    ii)   Signal to noise ratio
    iii)   Radar cross section of targets.

<div align="center">

(OR)

</div>

3. a) Explain the basic principles of Radar and discuss about various parameters which improve the
      performance of the Radar.
   b) Discuss about Radar frequencies.

4. Explain how isolation between transmitter and receiver is obtained in CW radar.

<div align="center">

(OR)

</div>

5. Explain how the noise signals are limiting the performance of FMCW altimeter.

6. Explain the following limitations of MTI radar.
   a) Equipment instabilities.
   b) Scanning modulation.

c) Internal fluctuation of clutter.

(OR)

7. a) Draw and explain the frequency response characteristics of a MTI using Range gates and filters.
   b) A MTI Radar operates at frequency of 6Ghz with a PRF of 800 PPS. Calculate the lowest blind speeds of this Radar.

8. a) Draw and explain the following with respect to Tracking in range:
       i. Echo pulse
       ii. Early-late range gates
       iii. Difference signal between early and late range gates.
   b) Limitations of automatic detection and tracking.

(OR)

9. a) Draw and explain the wave front phase relationships in phase comparison monopulse radar.

   b) Write a brief note on acquisition and scanning patterns.
10. a) Explain the basic concept of phased array antennas.
    b) Explain characteristics of different radar displays.

(OR)

11. a) Write notes on:
        i) Noise figure
        ii) Noise temperature.
    b) Explain any two types of mixers

R15

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RADAR SYSTEMS
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<div align="center">PART A</div>   **(25 Marks)**

1.
a) Distinguish between average power and Peak power and express the relation between the two.   [2M]
b) Write simple Radar Equation.   [3M]
c) If the target and the Frequency source are moving close to each other, with constant velocity, explain the
   change in the frequency?   [2M]
d) What is the principle of CW Radar?   [3M]
e) What are blind speeds?   [2M]
f) What limitations of MTI Performance?   [3M]
g) What is Monopulse Tracking Radar?   [2M]
h) What is AGC in conical Scanning?   [3M]
i) Explain what is a matched filter with a Non White Noise and give the expression for it's frequency
   response.   [2M]
j) Explain the effect of Beam steering on the Beam width in a Phased array Radar and also give the
   expression for the beam width .   [3M]

<div align="center">Part B</div>   **50 Marks**

2. What is Maximum Unambiguous Range? How is it related with pulse repetition rate?
<div align="center">(OR)</div>
3. Explain in detail various system losses involved in Radar system.
4. a) What is the Doppler effect? What are some of the ways in which it manifests itself? What are its radar
      applications?
   b) What is the relation between bandwidth and the acceleration of the target with respect to radar?
<div align="center">(OR)</div>
5. Discuss about the Multiple Frequency CW Radar.
6. a) Explain the function of time domain filter in a MTI Radar with an example.
   b) A MTI radar operates at 10GHz with a PRF of 300 pps. Calculate the lowest blind speed?
<div align="center">(OR)</div>
7. a) What is an MTI Radar and how does it operate.
   b) Define blind speed. A MTI radar operates at 5 Ghz with a PRF of 100PPS. Find the three lowest blind
      speeds of this Radar. Explain the importance of Staggered PRF.
8. a) Compare the tracking techniques.

b) Explain in detail about limitations to tracking accuracy.

(OR)

9. a) With a neat diagram explain the operation of a conical scan Radar. Explain the various factors that need to be considered for optimum squint angle.

b) Explain with the help of a neat block diagram Amplitude comparison Monopulse radar for extracting error signals in both Azimuth and Elevation.

10. What is meant by correlation? Explain cross relation with the help of neat block diagram.

(OR)

11. Establish the impulse response characteristic for a matched filter

R15

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RADAR SYSTEMS
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PART A   (25 Marks)

1.
a) Explain the relation between Pulse Repetition period and Pulse Repetition frequency in a Radar System.
[2M]

b) Explain what is meant by false alarm.   [3M]

c) Explain how the Doppler effect is used to determine velocity of targets in Radar systems?   [2M]

d) What is FM-CW Altimeter?   [3M]

e) Compare and contrast the situations with a power amplifier and a power oscillator in the transmitter of an MTI system.   [2M]

f) Distinguish between MTI and Pulse Doppler Radar.   [3M]

g) What is Phase Comparison Monopulse?   [2M]

h) Define Beam, rotation and Target axis in conical scanning.   [3M]

i) What is the Rule of Thumb relation between the Bandwidth B and the pulse width v in a matched filter receiver   [2M]

j) State a few important advantages of Phased array Radars   [3M]

Part B   50 Marks

2. a) Explain how a threshold level is selected in threshold detection?
   b) How to find the number of pulses that returned from a point target as the radar antenna scans through its beam width?
   c) Why most of the radar receivers are considered as envelop detectors while calculating the SNR?

(OR)

3. a) A low power, short range radar is solid-state throughout, including a low-noise RF amplifier which gives it an overall noise figure of 4.77dB. If the antenna diameter is 1m, the IF bandwidth is 500 kHz, the operating frequency is 8 GHz and the radar set is supposed to be capable of detecting targets of 5m2 cross sectional area at a maximum distance of 12 km, what must be the peak transmitted pulse power?
   b) The average false alarm time is a more significant parameter than the false alarm probability. Give the reasons.
   c) Why post detection integration is not as efficient as pre-detection integration of radar pulses?

4. a) Draw the block diagram of a FMCW Radar using side band super heterodyne receiver and explain it's operation.

    b) With a transmit (CW) frequency of 5GHz, calculate the Doppler frequency seen by a Stationary Radar when the target radial velocity is 100 km/h (62.5 mph)?

(OR)

5. a) Explain the operation of the two frequency CW Radar.
    b) How to select the difference between the two transmitted signals of CW radar?

6. a) Compare MTI Radar with Pulse Doppler radar.
    b) Explain the function of a single delay line canceller and derive an expression for the frequency response function.

(OR)

7. a) Compare and contrast the situations with a Power amplifier and Power oscillator in the transmitter of a MTI system.
    b) Calculate the blind speed for a Radar with the following specifications: Wave length: 0.1 mtr and PRF : 200 Hz

8. Why is amplitude comparison mono pulse more likely to be preferred over the phase comparison mono pulse and conical scan tracker over sequential lobbing, or lobe switching tracker? Explain.

(OR)

9. a) Discuss in detail about the Amplitude fluctuations and how its effects are minimized.
    b) Explain Mono pulse tracking in two angle coordinates.

10. Explain the expression for frequency response of the matched filter with Non White noise.

(OR)

11. Explain how beam width of a phase array antenna will vary with steering angle.

IV ECE - WCN (A80454)

MODEL PAPER –I
MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
IV B.Tech II Semester Examinations

Time: 3 hours   Max. Marks: 75marks

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Part A is compulsory which carriers 25 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   (25marks)

1.
a) Write some examples for wireless communication system.   [2M]
b) Write a short note on cordless telephone systems?   [3M]
c) Define large scale propagation model?   [2M]
d) Explain about free space propagation model?   [3M]
e) What is Doppler shift?   [2M]
f) Explain impulse response model of a multipath channel?   [3M]
g) Write an IEEE standard name for Wi-Fi &Bluetooth?   [2M]
h) Explain Advantages & Disadvantages of WLAN?   [3M]
i) Define WLL?   [2M]
j) Explain briefly IEEE 802.11 medium access control?   [3M]

PART B   (50marks)

2.a) Briefly explain mobile radio evolution.   [6M]
 b) Briefly compare the common wireless communication systems.   [4M]

OR

3.a) Explain about 2G and 3G cellular networks.   [6M]
 b) Explain about WLL and WLAN.   [4M]

4. a) Write a short note on Fresnel zone geometry and Knife edge diffraction model? [6M]
b) Explain the terms signal penetration into buildings and Ray tracing and site specific   modeling?
                                  [4M]
OR
5.a)Explain about reflection from perfect conductors and Ground reflection model.   [4M]
b) Explain any two outdoor propagation models.   [6M]

6. a) What are factors influencing small scale fading?   [4M]
   b) Explain briefly about parameters of mobile multipath channels? [6M]
OR
7.a) Explain different types of small scale fading?   [4M]
   b) Explain briefly about Two -ray Rayleigh fading model?   [6M]

8.a) Explain different types of WLAN Topologies?   [5M]
b)Compare standards of I EEE 802.11 a, b, g and n standards?   [5M]
                OR
9a) Explain briefly IEEE 802.11 medium access control?   [5M]
b)Explain briefly about WLAN & WLL?   [5M]

10.a) Explain the functional requirements of HYPERLAN.   [5M]

b) Explain the functioning of WATM with basic architecture. [5M]

OR

11.a) Explain about data oriented CDPD network. [4M]

b) Write short note on GSM and GPRS [6M]

MODEL PAPER –II
MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
IV B.Tech II Semester Examinations

Time: 3 hours   **Max. Marks: 75marks**

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Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
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PART A   **(25marks)**

1.

a)	Write a short note on cellular telephone systems?	[2M]
b)	Write a short note on 2G cellular systems?	[3M]
c)	What are the factors influencing small scale fading?	[2M]
d)	Name some of the outdoor propagation models?	[3M]
e)	What is Doppler gspread?	[2M]
f)	What are statistical models for multiparty fading channels?	[3M]
g)	Define IEEE 802.11?	[2M]
h)	What are enhancements in IEEE 802.16?	[3M]

i)   Define HIPER LAN?   [2M]
j)   Explain briefly about Wireless ATM?   [3M]

PART B   **(50marks)**

2.a) Briefly explain about paging systems.   [4M]
 b) Briefly explain modern wireless communication systems.   [6M]

OR

3.a) Write note on trends in cellular radio and personal communications.   [5M]
 b) Write note on Bluetooth and PAN.   [5M]

4. a) Explain the basic propagation mechanisms.   [4M]
b) Explain any two indoor propagation models.   [6M]

OR

5.a)Write a note on reflection from dielectrics and Brewster angle.   [6M]
b) Explain Longley Ryce outdoor propagation model.   [4M]

6. a) Explain impulse response model of a multipath channel and derive relationship between bandwidth and received
power.   [6M]
 b) Explain briefly about parameters of mobile multipath channels?   [4M]

OR

7.a) Explain different types of small scale fading?   [4M]
 b) Explain clarets model for flat fading?   [6M]

8.a) Write note on IEEE 802.11 architecture and services.   [5M]
b)Write note on Bluetooth and IEEE 802.15 standard.   [5M]

OR

9a) Explain briefly about IEEE 802.11 standards?   [5M]
b)Explain briefly about different specifications of IEEE 802.15.   [5M]

10.aWrite note on the specifications of HYPERLAN-2.   [5M]
b) Write note on GPRS and higher data rates.   [5M]

OR

11.a)Explain the similarities between HYPERLAN 1 and HYPERLAN 2.   [6M]
b)Write short note on short messaging service in GSM.   [4M]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech II Semester Examinations

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PART A   **(25marks)**

1.

a)	Write a short note on paging systems?	[2M]
b)	Write a short note on WLANs?	[3M]
c)	What are the factors influencing small scale fading?	[2M]
d)	Write note on log-distance path loss model.	[3M]
e)	Define coherence Bandwidth.	[2M]
f)	Explain briefly about Level crossing and fading statistics.	[3M]
g)	Define Bluetooth.	[2M]
h)	Compare standards of I EEE 802.11 a, b, g and n standards.	[3M]
i)	Define WATM?	[2M]
j)	Write note on data oriented CDPD network.	[3M]

PART B   **(50marks)**

2.a) Briefly explain about WLL and LMDS.   [4M]
 b) Briefly explain the evolution of mobile radio communication.   [6M]

OR

3.a) Explain about different wireless communication systems.   [6M]
 b) Write note on 2G and 3G cellular networks.   [5M]

4. a) Explain knife-edge diffraction model and multiple knife-edge diffraction. [6M]
b) Explain Okumura and Hata models.   [4M]
OR
5.a)Write a note on indoor propagation models.   [6M]
b) Explain free space propagation model.   [4M]

6. a) What are factors influencing small scale fading?   [6M]
   b) Explain briefly about Two -ray Rayleigh fading model?   [6M]
OR
7.a) Explain briefly about parameters of mobile multiparty channels.   [4M]

b) Explain simulation of Clarke and Guns fading model?   [6M]

8.a) Describe WLAN standards.   [5M]
b)Write note on IEEE 802.15 logical link control and adaptation protocol.   [5M]
                    OR
9a) Explain briefly about IEEE 802.11 medium access control layer.   [5M]
b)Explain briefly about WLAN and Bluetooth.   [5M]

10.a) Explain briefly about mobile data networks.   [5M]
b) Write note on HYPERLAN specifications.   [5M]
                    OR
11.a)Explain the frame format of Wireless ATM.   [6M]
b)Write short note on mobile application protocols.   [4M]

   Code No: 118FG
      JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
         B. Tech IV Year II Semester Examinations, April - 2018
            WIRELESS COMMUNICATIONS AND NETWORKS

Time: 3 hours   **Max. Marks: 75**

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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

(25 Marks)

1.a)   What is intersystem handoff?   [2]
 b)   Discuss about Longley-Ryce Model.   [3]
 c)   Define Brewster angle.   [2]
 d)   What are the Time Dispersion Parameters of Multipath channels?   [3]
 e)   Discuss about advantages and disadvantages of WLAN.   [2]
 f)   Discuss about Ericsson Multiple Breakpoint Model.   [3]
 g)   Define Adjacent-channel Interference.   [2]
 h)   Define equalization.   [3]
 i)   List the advantages of WLAN.   [2]
 j)   Write about hiper lan WLL.   [3]

PART - B

(50 Marks)

2.   Explain the various types of Handoff processes available.   [10]

OR

3.   Explain in detail about Trunking and Grade of Service.   [10]

4.a)   Explain knife Edge Diffraction Model.
 b)   With neat diagrams explain the Free Space Propagation Model.   [5+5]

OR

5.   Derive the Impulse response model of a Multipath channel.   [10]

      Discuss in detail different types of small scale fading.   [10]

OR

7.   What is small scale fading? What are the factors influencing small scale fading? [10]

8.   Explain LMS and Recursive Least Square algorithm.   [10]

OR

9.   Derive the expression for Maximal Ratio Combining Improvement.   [10]

10.a) Draw the configuration of IEEE802.11 architecture.
  b) Explain the physical layer specications of IEEE802.11 using infrared.   [5+5]

OR

11.Compare and contrast IEEE 802.11 a, b, g and n standards.   [10]

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks
- - -

1.a) Explain about the Public Switched Telephone Network (PSTN).
 b) Briefly explain evolution of mobile radio communication.　　　　[7+8]

2.a) Explain the logic link control of Bluetooth.
 b) Bring out the salient features of third generation wireless networks.　　　　[7+8]

3.a) Why sectorization of cell is very important and writes its advantages?
 b) What is hand-off process? Explain the hand-off mechanism?
 c) Prove that for a hexagonal geometry, the co-channel reuse ratio is given by
　　$Q = \sqrt{3N}$, where $N = i^2 + ij + j^2$.　　　　[4+4+7]

4.a) Distinguish between FDMA and SDMA with a neat sketches.
 b) Explain in detail the operation of spread spectrum multiple accesses.　　　　[7+8]

5.a) Briefly explain about Traffic Routing in wireless networks.
 b) Discuss briefly about the development of wireless networks.　　　　[7+8]

6.a) Explain how location and management is achieved in GPRS?
 b) Explain about packet and frame formats in IS-95.　　　　[7+8]

7.a) Mention the functional requirements of Hyper LAN.
 b) Explain the functioning of WATM with basic architecture.　　　　[7+8]

8.a) Differentiate between Single channel system and Multi channel system.
 b) Derive mathematical representation of OFDM signal.　　　　[7+8]