INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**WIRELESS COMMUNICATIONS AND NETWORKS**				
Course Code	AEC524				
Programme	B. Tech				
Semester	VI	ECE			
Course Type	PROFESSIONAL ELECTIVE				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	-	3	-	-
Chief Coordinator	Mr. A Karthik, Assistant Professor				
Course Faculty	Mr. A Karthik, Assistant Professor				

COURSE OBJECTIVES

The course should enable the students to:

S.No	Description
I	Provide fundamental treatment about many practical and theoretical concepts that forms basic of Wireless communications.
II	Equip various kinds of wireless networks and its operations.
III	Understand the concept of frequency reuse, and be able to apply it in the design of mobile cellular system.
IV	Understand various modulation schemes and multiple access techniques that are used in wireless

COURSE OUTCOMES (COs):

S.No	Description
CO1	Demonstrate their understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards..
CO2	Compare different technologies used for wireless communication systems operations.
CO3	Explain the architecture, functioning, protocols capabilities and application of various wireless communication networks
CO4	Demonstrate an ability explain multiple access techniques for Wireless Communication
CO5	Demonstrate an ability to evaluate design challenges, constraints and security issues associated with Ad-hoc wireless networks.

COURSE LEARNING OUTCOMES

Students who complete the course will have demonstrated the ability to do the following.

CLO Code	CLO's	At the end of the course, the student will have the ability to:
AEC524.01	CLO 1	Understand the principles and fundamentals of wireless communications.
AEC524.02	CLO 2	Demonstrate cellular system design concepts in wireless mobile communication networks.
AEC524.03	CLO 3	Understand the fundamental Radio Wave Propagation Mechanisms.

CLO Code	CLO's	At the end of the course, the student will have the ability to:
AEC524.04	CLO 4	Analyze perspective on Fundamentals of Equalization and Mobile Radio Propagation Multipath Measurements.
AEC524.05	CLO 5	Analyze various multiple access schemes and techniques used in wireless communication.
AEC524.06	CLO 6	Discuss the Parameters of Mobile Multipath Channels and Types of Small-Scale Fading-Fading effects.
AEC524.07	CLO 7	Examine the perspective on Fundamentals of Equalization, Linear Equalizers, Non-linear Equalization.
AEC524.08	CLO 8	Study and understand the Diversity Techniques and RAKE Receiver in Radio Propagation.
AEC524.09	CLO 9	Demonstrate wireless local area networks and their specifications in communication system.
AEC524.10	CLO 10	Understand the analytical perspective on the design and analysis of the traditional and emerging wireless networks
AEC524.11	CLO 11	Discuss the nature of and solution methods to the fundamental problems in wireless networking.
AEC524.12	CLO 12	Understand the architecture of the various wireless wide area networks such as GSM, IS-95, GPRS and SMS.
AEC524.13	CLO 13	Understand the operation of the various wireless wide area networks such as GSM, IS-95, and SMS.
AEC524.14	CLO 14	Understand the existing and emerging wireless standards in wireless wide area networks
AEC524.15	CLO 15	Examine the emerging techniques OFDM and its importance in the wireless communications.

UNIT-I
THE CELLULAR CONCEPT-SYSTEM DESIGN FUNDAMENTALS

PART A:(Short Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	State frequency reuse.	Understand	C01	AEC524.01
2	Appraise is micro cell zone.	Understand	C01	AEC524.01
3	State frequency planning.	Remember	C01	AEC524.01
4	Appraise is cellular frequency reuse concept.	Remember	C01	AEC524.01
5	State channel assessment strategies.	Understand	C01	AEC524.01
6	Appraise is the demerit of cell splitting.	Remember	C01	AEC524.01
7	List out the handoff strategies.	Understand	C01	AEC524.02
8	Appraise is prioritizing handoffs.	Remember	C01	AEC524.02
9	Appraise are advantages of frequency reuse.	Understand	C01	AEC524.02
10	Distinguish between hard handoff and soft handoff.	Understand	C01	AEC524.02
11	State co-channel interference.	Remember	C01	AEC524.02
12	Appraise is adjacent channel interference.	Understand	C01	AEC524.02
13	State micro cells.	Remember	C01	AEC524.02
14	Appraise is meant by frequency reuse distance.	Remember	C01	AEC524.02
15	State grade of service.	Remember	C01	AEC524.02
16	State co-channel interference.	Understand	C01	AEC524.02
17	Appraise is trunking efficiency.	Remember	C01	AEC524.02
18	State cell splitting.	Understand	C01	AEC524.02
19	State sectoring.	Remember	C01	AEC524.02
20	State adjacent channel interference.	Remember	C01	AEC524.02

PART B:(Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome

1	Mention the significance of frequency reuse in cellular networks. Explain about frequency reuse strategies.	Understand	C01	AEC524.01
2	Distinguish between fixed channel assignment and dynamic channel assignment in cellular networks.	Analyse	C01	AEC524.01
3	Describe the concept of frequency reuse. Derive the equation for the frequency.	Understand	C01	AEC524.01
4	Describe the concept of Interference and system capacity.	Remember	C01	AEC524.01
5	Illustrate the handoff scenario at cell boundary with a neat diagram.	Understand	C01	AEC524.01
6	Summarize signal to interference ratio. Obtain the equation of signal to Interference ratio for a mobile receiver.	Understand	C01	AEC524.02
7	Analyse the improving coverage and capacity in cellular systems.	Analyse	C01	AEC524.02
8	Demonstrate in detail of Sectoring with neat sketch.	Understand	C01	AEC524.02
9	Extended the channel planning for wireless systems.	Understand	C01	AEC524.03
10	Summarize the Channel assignment strategies in detail.	Understand	C01	AEC524.03
11	Simplify the fundamental design concepts in cellular systems.	Analyse	C01	AEC524.01
12	Determine the handoff strategies.	Evaluate	C01	AEC524.01
13	List out the different types of handoff methods	Understand	C01	AEC524.01
14	Describe the concept of cell splitting and explain another improving coverage and capacity in cellular sytem.	Remember	C01	AEC524.02
15	Illustrate the concept of microcell zone concept	Remember	C01	AEC524.01
16	State the cell splitting and how to improve the capacity in cellular system.	Understand	C01	AEC524.01
17	Justify the handoff. Explain the prioritizing handoffs method in detail.	Evaluate	C01	AEC524.02
18	Describe the repeaters for range extension in cellular systems.	Understand	C01	AEC524.01

PART C: (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	A hexagonal cell within a four-cell system has a radius of 1 .387 km. A total of 60 channels are used within the entire system. If the load per user is 0.029 Erlangs, and A.= 1 call/hour, compute the following for an Erlang C system that has a 5% probability of a delayed call: a)How many users per square kilometer will this system support. (b) Appraise is the probability that a delayed call will have to wait for more than 10 s. (c) Appraise is the probability that a call will be delayed for more than 10 seconds.	Evaluate	C01	AEC524.01
2	An urban area has a population of two million residents. Three competing trunked mobile networks (systems A, B, and C) provide cellular service in this area. System A has 394 cells with 19 channels each, system B has 98 cells with 57 channels each, and system C has 49 cells, each with 100 channels. Find the number of users that can be supported at 2% blocking if each user averages two calls per hour at average call duration of three minutes. Assuming that all three trunked systems are operated at maximum capacity, compute the percentage market penetration of each cellular provider.	Understand	C01	AEC524.02
3	How many users can be supported for 0.5% blocking probability for the following number of trunked channels in a blocked calls cleared system. (a) 1, (b)5, (c) 1 0, (d) 20, (e) 100. Assume each user generates 0.1 Erlangs of traffic.	Remember	C01	AEC524.02
4	If a signal-to-interference ratio of 15 dB is required for satisfactory forward channel performance of a cellular system, Appraise is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is (a) n = 4, (b) n = 3. Assume that there are six co- channel cells in the first tier, and all of them are at the same distance from the mobile. Use suitable approximations.	Understand	C01	AEC524.02

5	If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) four-cell reuse, (b) seven-cell reuse, and (c) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.	Understand	C01	AEC524.03
6	How to improve coverage and capacity in cellular systems and explain in detail of cell splitting.	Understand	C01	AEC524.02
7	Narrate the different types sectoring in cellular systems explain in detail.	Remember	C01	AEC524.02
8	Highlight the co-channel reuse ratio and briefly explain system capacity	Understand	C01	AEC524.02
9	Determine the concept of practical handoff considerations.	Evaluate	C01	AEC524.03
10	Develop the equation in trunking and grade od service.	Create	C01	AEC524.02

UNIT -II
MOBILE RADIO PROPOGATION

PART A(Short Answer Questions)

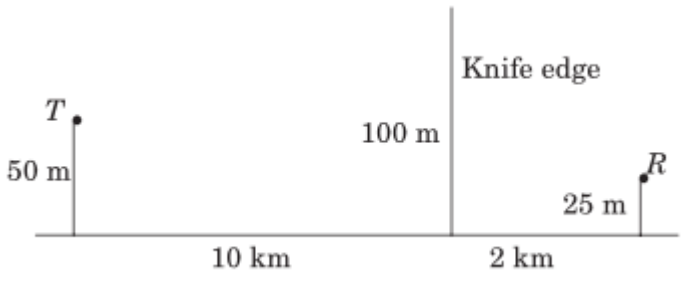
S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	State free space propagation model.	Remember	CO2	AEC524.04
2	Relation between gains of an antenna to its effective aperture (A_e).	Understand	CO2	AEC524.04
3	State effective isotropic radiated power(EIRP)	Understand	CO2	AEC524.04
4	State path loss.	Understand	CO2	AEC524.04
5	State diffraction.	Remember	CO2	AEC524.04
6	Appraise is Doppler shift.	Remember	CO2	AEC524.05
7	Write the equation for long distance path loss model.	Understand	CO2	AEC524.05
8	Write short notes on ray tracing.	Remember	CO2	AEC524.05
9	State scattering.	Understand	CO2	AEC524.05
10	Write the equation for Friis free space equation.	Remember	CO2	AEC524.05
11	Appraise are the basic propagation mechanisms.	Understand	CO2	AEC524.05
12	Classification of outdoor propagation model.	Understand	CO2	AEC524.05
13	Write the equation for path loss.	Understand	CO2	AEC524.04
14	State reflection.	Understand	CO2	AEC524.05
15	State Brewster angle.	Understand	CO2	AEC524.05
16	State large scale propagation	Remember	CO2	AEC524.05
17	State small scale propagation	Remember	CO2	AEC524.04
18	Write the equation in free space, power flux density.	Understand	CO2	AEC524.04
19	Appraise are the outdoor propagation models.	Understand	CO2	AEC524.05
20	State the point-point mode prediction.	Understand	CO2	AEC524.04

PART B (Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Describe the two-ray model is used when a single ground reflection dominates the multipath effect.	Remember	CO2	AEC524.04
2	How the received signal strength is predicted using the free space propagation model and explain in detail.	Remember	CO2	AEC524.04
3	Classify the outdoor propagation model and discuss in detail.	Understand	CO2	AEC524.04
4	Classify the indoor propagation model and discuss in detail.	Understand	CO2	AEC524.04
5	Express about Fresnel zone geometry model	Remember	CO2	AEC524.04
6	Describe the advantages and disadvantages of two ray ground reflection model in the analysis of the path loss.	Understand	CO2	AEC524.05
7	Illustration of knife-edge diffraction geometry model.	Understand	CO2	AEC524.05
8	Demonstrate the three basic propagation mechanisms.	Understand	CO2	AEC524.05
9	Summarize about concept of reflection in detail.	Understand	CO2	AEC524.05

10	State and Explain in detail about attenuation factor model	Remember	CO2	AEC524.05
11	Distinguish about effective isotropic radiated power (EIRP).	Understand	CO2	AEC524.05
12	Describe the concept of diffraction and scattering in detail.	Remember	CO2	AEC524.04
13	Analyse the practical link budget design using path loss models.	Analyse	CO2	AEC524.04
14	Classify the knife- edge diffraction model and also explain the multiple knife-edge diffraction.	Understand	CO2	AEC524.05
15	List out the different models in reflection and explain each model in detail.	Remember	CO2	AEC524.04
16	List out the different models in diffraction and explain each model in detail.	Remember	CO2	AEC524.04
17	Illustration of outdoor propagation models and also explain different concept in that model.	Understand	CO2	AEC524.05
18	Summarize the ray tracing and site specific modelling.	Understand	CO2	AEC524.05

PART C: (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Evaluate the far-field distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHz.	Remember	CO2	AEC524.04
2	If a transmitter produce 50W of power express the transmit power in units of dBm, dBW. If 50W is applied to a unity gain antenna with 900MHz carrier frequency, find the receiver power in dBm at a free space distance of 100m from the antenna. Appraise is P_r (10KM). Assume unity gain receiver antenna.	Remember	CO2	AEC524.04
3	Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 900 MHz, free space propagation is assumed, Gr = 1, and Gr = 2, find (a) the power at the receiver, (b) the magnitude of the E-field at the receiver antenna, (c) the rms voltage applied to the receiver input assuming that the receiver antenna has a purely real impedance of 50 Ωand is matched to the receiver.	Understand	CO2	AEC524.05
4	Calculate the Brewster angle for a wave impinging on ground having a permittivity of Er = 4.	Remember	CO2	AEC524.04
5	A mobile is located 5 km away from a base station and uses a vertical χ/ 4 monopole antenna with a gain of 2.55 dB to receive cellular radio signals. The E-field at 1 km from the transmitter is measured to be 10--3 V/m. The carrier frequency used for this system is 900 MHz. (a) Find the length and the effective aperture of the receiving antenna.(b) Find the received power at the mobile using the two-ray ground reflection model assuming the height of the transmitting antenna is 50 m and the receiving antenna is 1 .5 m above ground.	Understand	CO2	AEC524.05
6	Given the following geometry, determine (a) the loss due to knife edge diffraction, and (b) the height of the obstacle required to induce 6 dB diffraction loss. Assume f = 900 MHz. 	Remember	CO2	AEC524.04
7	Evaluate the median path loss using Okumura's model for d = 50 km, hte =100 m, hre = 10 m in a suburban environment. If the base station transmitter radiates an EIRP of 1 kW at a carrier frequency of 900 MHz, find the power at the receiver (assume a unity gain receiving antenna).	Remember	CO2	AEC524.04
8	Identify general characteristics of signal penetration into buildings.	Apply	CO2	AEC524.05

UNIT-III
CELLULAR SYSTEM DESIGN FUNDAMENTALS

PART A (Short Answer Questions)

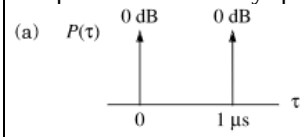
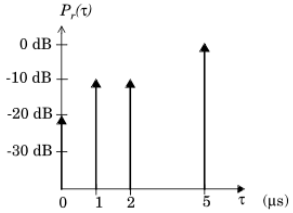
S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	State small scale multipath propagation.	Remember	CO3	AEC524.06
2	State multipath.	Remember	CO3	AEC524.06
3	Relationship between bandwidth and received power.	Understand	CO3	AEC524.06
4	Appraise are the techniques classified for the small scale multipath	Remember	CO3	AEC524.06
5	Appraise are the parameters of time dispersion.	Understand	CO3	AEC524.06
6	State Doppler spread and coherence time.	Understand	CO3	AEC524.06
7	State coherence bandwidth.	Remember	CO3	AEC524.06
8	Write any two differences between frequency selective fading and flat	Remember	CO3	AEC524.06
9	Write the parameters of time dispersion parameters.	Remember	CO3	AEC524.06
10	Write the factors influencing of small scale fading.	Understand	CO3	AEC524.06
	CIE-II			
11	Draw the block diagram of direct RF channel impulse response measurement	Understand	CO3	AEC524.06
12	Draw the block diagram of direct spread spectrum channel impulse response	Understand	CO3	AEC524.06
13	Appraise are the parameters of mobile multipath channels.	Understand	CO3	AEC524.06
14	State Spread Spectrum Sliding Correlator Channel Sounding.	Understand	CO3	AEC524.07
15	State Frequency Domain Channels Sounding.	Understand	CO3	AEC524.07
16	State means excess delay.	Understand	CO3	AEC524.07
17	State rms delay spread.	Understand	CO3	AEC524.07
18	Write multipath shape factors for small scale fading.	Understand	CO3	AEC524.08
19	State received power.	Remember	CO3	AEC524.08
20	State received envelope.	Understand	CO3	AEC524.08

PART B (Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	State small scale fading .Write the factors influencing fading.	Understand	CO3	AEC524.06
2	Describe about impulse response model of a multipath channel.	Understand	CO3	AEC524.06
3	Classification of the small scale multipath measurements and explain in detail	Understand	CO3	AEC524.06
4	Demonstrate the spread spectrum channel impulse response Measurement system with a neat block diagram.	Understand	CO3	AEC524.06
5	Distinguish about frequency domain channel impulse response Measurement system with a neat block diagram.	Analyse	CO3	AEC524.06
6	List out the parameters of mobile multipath channels. Write brief notes of each parameter of mobile multipath channels.	Understand	CO3	AEC524.07
7	Demonstrate about small scale fading based on multipath delay spread in detail.	Understand	CO3	AEC524.07
8	Narrate about small scale fading based on Doppler spread in detail.	Understand	CO3	AEC524.08
9	Describe the Relationship Between Bandwidth and Received Power.	Understand	CO3	AEC524.08
	CIE-II			
10	Summarize the Doppler spread and coherence time	Understand	CO3	AEC524.06
11	List out the different types of small scale fading. Also explain each type in detail	Understand	CO3	AEC524.07
12	Highlight fading effects due to multipath time delay spread in detail.	Understand	CO3	AEC524.07
13	Describe the statistical models for multipath fading channels in different	Understand	CO3	AEC524.08
14	State small scale propagation and also explain the level crossing and fading statistics	Understand	CO3	AEC524.08

15	Illustrate the spectral shape due to Doppler spread in Clarke in detail.	Understand	CO3	AEC524.09
16	Describe the function of level crossing and fading statistics.	Understand	CO3	AEC524.09
17	Summarize about two-ray Rayleigh fading model with a neat block diagram.	Understand	CO3	AEC524.06

PART C: (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Course Out co	Course Learning Outcome
1	For a Rayleigh fading signal find a) Number of zero level crossings b) The average fade duration for threshold levels ρ=0.1 and ρ=1 when Doppler frequency is 20Hz.	Remember	CO3	AEC524.06
2	For a Rayleigh fading signal find the average fade duration for threshold levels	Remember	CO3	AEC524.06
3	Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. For a vehicle moving 60 mph, compute the received carrier frequency if the mobile is moving (a) directly toward the transmitter, (b) directly away from the transmitter, and (c) in a direction which is perpendicular to the direction of arrival of the transmitted signal.	Remember	CO3	AEC524.06
4	Assume a mobile traveling at a velocity of 10 m/s receives two multipath components at a carrier frequency of 1000 MHz. The first component is assumed to arrive at τ = 0 with an initial phase of oo and a power of -70 dBm, and the second component which is 3 dB weaker than the first component is assumed to arrive at τ = 1 J.l.S, also with an initial phase of 0°. If the mobile moves directly toward the direction of arrival of the first component and directly away from the direction of arrival of the second component, compute the narrowband instantaneous power at time intervals of 0.1 s from 0 s to 0.5 s. Compute the average narrowband power received over this observation interval. Compare average narrowband and wideband received powers over the interval, assuming the amplitudes of the two multipath components do not	Remember	CO3	AEC524.07
	CIE-II			
5	Compute the RMS delay spread for the following power delay profile: (a)  (b) If BPSK modulation is used, Appraise is the maximum bit rate that can be sent through the channel without needing an equalizer.	Remember	CO3	AEC524.06
6	Calculate the mean excess delay, rms delay spread, and the maximum excess delay (1 0 dB) for the multi path profile given in the figure below. Estimate the 50% coherence bandwidth of the channel. Would this channel be suitable for AMPS or GSM service without the use of an equalizer. 	Understand	CO3	AEC524.07
7	Determine the proper spatial sampling interval required to make small scale Propagation measurements which assume that consecutive samples are highly correlated in time. How many samples will be required over 10 m travel distance if fc = 1900 MHz and v = 50 m/s. How long would it take to make these measurements, assuming they could be made in real time from a moving vehicle. Appraise is the Doppler spread $B_0$for the channel.	Understand	CO3	AEC524.06
	UNIT-IV EQUALIZATION AND DIVERSITY			
	PART A(Short Answer Questions)			

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	State diversity.	Understand	CO4	AEC524.10
2	State equalization.	Remember	CO4	AEC524.10
3	Appraise are the different receiver diversity combining techniques.	Understand	CO4	AEC524.10
4	Appraise is prediction error.	Remember	CO4	AEC524.10
5	Classification of equalizers in communication receiver.	Remember	CO4	AEC524.10
6	State the types of linear equalizers.	Understand	CO4	AEC524.10
7	State the types of nonlinear equalizers.	Remember	CO4	AEC524.10
8	Appraise is mean by rate of convergence.	Remember	CO4	AEC524.11
9	Appraise are the factors present in algorithms for adaptive equalization.	Understand	CO4	AEC524.11
10	State zero forcing algorithms.	Remember	CO4	AEC524.11
11	Write short notes on least mean square algorithm.	Remember	CO4	AEC524.11
12	State polarization diversity.	Understand	CO4	AEC524.12
13	Appraise are the classifications of space diversity reception method.	Understand	CO4	AEC524.12
14	Difference between frequency diversity and time diversity.	Remember	CO4	AEC524.12
15	State rake receiver.	Understand	CO4	AEC524.12
16	State inter symbol interference.	Remember	CO4	AEC524.11
17	State adaptive equalizers.	Understand	CO4	AEC524.12
18	State transversal filters.	Remember	CO4	AEC524.11
19	State rate of convergence.	Remember	CO4	AEC524.12
20	State mis adjustment.	Understand	CO4	AEC524.11

PART B(Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Classify different receiver diversity combining techniques. Explain in detail.	Analyse	CO4	AEC524.10
2	Summarize the algorithms for adaptive equalization	Understand	CO4	AEC524.10
3	Describe the fundamental concept of equalization	Understand	CO4	AEC524.10
4	Determine maximum likelihood sequence estimation (mlsc) equalizer	Evaluate	CO4	AEC524.10
5	Summarize the simplified communications system using an adaptive equalizer at the receiver with neat diagram	Understand	CO4	AEC524.10
6	Illustrate in detail about the categories of the practical space diversity considerations.	Understand	CO4	AEC524.10
7	Classify the structure of linear equalizer techniques in detail.	Analyse	CO4	AEC524.11
8	Determine the structure of nonlinear equalizer techniques in detail	Evaluating	CO4	AEC524.11
9	Obtain the equation of maximal ratio combining improvement.	Remember	CO4	AEC524.11
10	Express the equation of selection diversity improvement.	Remember	CO4	AEC524.11
11	Design block diagram of an M branch rake receiver implementation	Understand	CO4	AEC524.12
12	Categorize the algorithms for adaptive equalization and explain in detail.	Understand	CO4	AEC524.12
13	Describe the line equalizers and Non equalizers.	Understand	CO4	AEC524.10
14	Summarize the maximum likelihood sequence estimation equalizer with a	Understand	CO4	AEC524.10
15	Determine the techniques of diversity and also write the derivation of	Evaluate	CO4	AEC524.11
16	State the polarization diversity. Write theoretical model for polarization diversity.	Understand	CO4	AEC524.11
17	Determine the derivation of maximal ratio combining improvement.	Evaluate	CO4	AEC524.11
18	Illustrate the feedback or scanning diversity and also explain about maximal ratio combining	Understand	CO4	AEC524.10

PART C: (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Evaluate the equation of maximal ratio combining improvement and also write about the equalization.	Evaluating	CO4	AEC524.10
2	Describe the survey of equalization techniques with a neat sketch	Understand	CO4	AEC524.11

3	Consider the design of the US Digital Cellular equalizer. If the carrier frequency is 900 MHz and the mobile velocity v= 80 krn/hr, determine the following: (a) the maximum Doppler shift (b)the coherence time of the channel (c) the maximum number of symbols that could be transmitted without updating the equalizer, assuming that the symbol rate is 24.3 k symbols/sec	Understand	CO4	AEC524.10
4	Assume four branch diversity is used, where each branch receives an inde - pendent Rayleigh fading signal. If the average SNR is 20 dB, determine the probability that the SNR will drop below 10 dB. Compare this with the case of a single receiver without diversity.	Remember	CO4	AEC524.11
5	Evaluate the equation of selection diversity improvement.	Evaluating	CO4	AEC524.10
6	How would you identify training a generic adaptive equalizer	Understand	CO4	AEC524.10
7	Summarize the function of equalizers in a communication receiver.	Understand	CO4	AEC524.11
8	Describe the different techniques in survey of equalization	Understand	CO4	AEC524.10

UNIT-V
WIRELESS NETWORKS

PART A(Short Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	List out the wireless topologies	Remember	CO5	AEC524.13
2	State hyper LAN	Understand	CO5	AEC524.13
3	Write the advantages of wireless LAN	Understand	CO5	AEC524.13
4	Write the disadvantages of wireless LAN	Remember	CO5	AEC524.13
5	State the enhancement of IEEE 802.16	Remember	CO5	AEC524.14
6	Demonstrate about wireless LAN	Understand	CO5	AEC524.14
7	Demonstrate about wide LAN	Remember	CO5	AEC524.14
8	Appraise is IEEE 802.11a standard.	Understand	CO5	AEC524.15
9	Appraise is IEEE 802.11b standard.	Understand	CO5	AEC524.15
10	Appraise is IEEE 802.11g standard.	Remember	CO5	AEC524.15
11	Appraise is IEEE 802.11n standard.	Understand	CO5	AEC524.15
12	State PAN	Understand	CO5	AEC524.15
13	Appraise are the advantages of PAN.	Remember	CO5	AEC524.15
14	State WLL	Understand	CO5	AEC524.15
15	State common air interface	Understand	CO5	AEC524.14
16	Appraise is the function of central office.	Understand	CO5	AEC524.15
17	State local exchange carrier.	Remember	CO5	AEC524.14
18	State common channel signalling.	Understand	CO5	AEC524.15
19	State interoperator roaming.	Understand	CO5	AEC524.14
20	State IMT.	Remember	CO5	AEC524.15

PART B (Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Obtain the advantages and disadvantages of wireless local area networks.	Understand	CO5	AEC524.13
2	Summarize WLAN become a personal area network (PAN).	Understand	CO5	AEC524.13
3	Determine the characteristics of HIPER LAN.	Evaluate	CO5	AEC524.13
4	Classify the different topologies of wireless LAN. Explain in detail.	Analyse	CO5	AEC524.13
5	Comparison between the IEEE 802.11 a,b,g and n standards.	Evaluate	CO5	AEC524.14
6	Describe about wireless local loop. List out the advantages and disadvantages of the wireless loop.	Remember	CO5	AEC524.14
7	Outline about IEEE 802.11 medium access control .	Understand	CO5	AEC524.15
8	State and explain about IEEE 802.11 a standard. Determine the properties of IEEE 802.11 a.	Remember	CO5	AEC524.15

9	State and explain about IEEE 802.11 b standard. Determine the properties of IEEE 802.11 b.	Remember	CO5	AEC524.15
10	State and explain about IEEE 802.11 g standard. Determine the properties of IEEE 802.11 g.	Remember	CO5	AEC524.15
11	Determine the characteristics of HIPER LAN and explain different	Remember	CO5	AEC524.14
12	Outline about the IEEE 802.16 and its enhancements in detail.	Understand	CO5	AEC524.15
13	Describe the limitations in wireless networking.	Remember	CO5	AEC524.14
14	Summarize about the development of wireless networks.	Understand	CO5	AEC524.15
15	Describe about traffic routing inn wireless networks.	Understand	CO5	AEC524.14

PART C: (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcome
1	Categorize about the enhancement of IEEE 802.16 standards.	Analyse	CO5	AEC524.15
2	Distinguish about the performance of integration of the existing wireless netwosrks.	Analyse	CO5	AEC524.14
3	Summarize the function of different topologies in wireless networks.	Understand	CO5	AEC524.15
4	List out difference of HIPER LAN and Wireless PANs	Remember	CO5	AEC524.14
5	State the comparison of IEEE 802.11 a,b,g and n standards	Remember	CO5	AEC524.15