

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

ASSIGNMENT QUESTIONS

| Course Name | : | WIRELESS COMMUNICATIONS AND NETWORKS |
|---------------------------|---|--|
| Course Code | : | A80454-R15 |
| Class | : | IV - B. Tech |
| Branch | : | ECE |
| Year | : | 2018 – 2019 |
| Course Coordinator | : | Mr. MD Khadir, Assistant. Professor, ECE Dept. |
| Course Faculty | : | Mr. MD Khadir, Assistant. Professor, ECE Dept. |
| | | Mr. U Soamnaidu, Assistant. Professor, ECE Dept. |

OBJECTIVE

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

| ASSIGNMENT-I | | | |
|---|---|--------------------------|-------------------|
| UNIT-I THE CELLULAR CONCEPT-SYSTEM DESIGN FUNDAMENTALS | | | |
| S. No | Questions | Blooms Taxonomy Level | Course Outcome |
| 1 | Mention the significance of frequency reuse in cellular networks. Explain about frequency reuse strategies? | Understand | 1 |
| 2 | Distinguish between fixed channel assignment and dynamic channel assignment in cellular networks? | Understand | 2 |
| 3 | Describe the concept of frequency reuse. Derive the equation for the frequency reuse ratio? | Understand | 2 |
| 4 | Consider a cellular system in which the total available voice channels to handle the traffic are 1200. The area of each cell is 9km ² and the total coverage area of the system is 3600km ² . Determine the system capacity if the cluster size size 4. | Remember | 1 |
| 5 | Illustrate the handoff scenario at cell boundary with a neat diagram? | Remember | 2 |
| 6 | Define signal to interference ratio. Derive the equation of signal to interference ratio for a mobile receiver? | Understand | 2 |
| 7 | Illustrate the cell splitting with in a 3km by 3km square centered around base station A with a neat diagram? | Understand | 2 |
| 8 | Define D, Dz, R, Rz for a microcell architecture with N=7? | Understand | 1 |

| 9 | What is cell-splitting? Explain its types in detail. | Remember | 1 |
|--|---|--|---|
| 10 | Consider maximum number of calls in one hour in one cell is 3500 and an | Remember | 2 |
| 11 | average calling time't' is 1.76 minutes. Calculate the offered load in the cell. | Domomhou | 2 |
| 11 | with cell radius of 2 km. Calculate the number of cells that would be needed | Kemember | Z |
| 12 | Assume a cellular system operates with traffic of 2500 Erlangs. If each user | Understand | 2 |
| | in the system uses phone for 3 minutes of busiest hour on an average case, | | |
| | then find the number of users which can be accommodated under even distribution | | |
| | A receiver equivalent noise figure value is 3 db. Find its equivalent noise | Understand | 2 |
| 13 | temperature. | Chieffornie | - |
| 14 | Consider a cellular system which consists of 34 cells with the cell radius as | Understand | 2 |
| | 1.4 km. a total frequency bandwidth is capable of supporting 343 traffic | | |
| | channels. Find what geographical area in km can be covered and the number of channels available per call [Assume $N=7$ reuse cellular pattern] | | |
| 15 | For a seven cell reuse pattern find the reuse factor if the minimum distance | Remember | 2 |
| | between centres of co-channel-cells is 18 km. Radius of cell is 3 km and the | | |
| | distance between adjacent cells in the seven cell pattern is 6 km. | | |
| 16 | Assume a cellular phone transmitter has deviation of 11 kHz frequency. If | Understand | 2 |
| | Hz and 3500 Hz, calculate their modulation index value | | |
| | | | |
| | UNIT –II | | |
| | MOBILE RADIO PROPOGATION | | |
| S. No | Questions | Blooms | Course |
| 1 | | Taxonomy Level | Outcome |
| 1. | Explain how the two-ray model is used when a single ground reflection dominates the multipath effect? | Remember | 3 |
| 2. | How the received signal strength is predicted using the free space | Remember | 3 |
| | propagation model? Explain? | | |
| 3. | propagation model? Explain? Classify the outdoor propagation model? Discuss in detail? | Understand | 3 |
| 3. 4. | propagation model? Explain? Classify the outdoor propagation model? Discuss in detail? Classify the indoor propagation model? Discuss in detail? | Understand Understand | 3 4 |
| 3. 4. 5. | propagation model? Explain? Classify the outdoor propagation model? Discuss in detail? Classify the indoor propagation model? Discuss in detail? Explain about Fresnel zone geometry model? | Understand Understand Understand | 3 4 4 |
| 3. 4. 5. 6. | propagation model? Explain? Classify the outdoor propagation model? Discuss in detail? Classify the indoor propagation model? Discuss in detail? Explain about Fresnel zone geometry model? Illustration of knife-edge diffraction geometry model? | Understand Understand Understand Understand | 3 4 4 4 |
| 3. 4. 5. 6. 7. | propagation model? Explain?Classify the outdoor propagation model? Discuss in detail?Classify the indoor propagation model? Discuss in detail?Explain about Fresnel zone geometry model?Illustration of knife-edge diffraction geometry model?Show that the Brewster angle is given by θ_i where $\sin \theta_i = \sqrt{\epsilon^2 r^{-\epsilon} r} / \sqrt{\epsilon^2 r^{-1}}$ | Understand Understand Understand Understand Understand | 3 4 4 4 4 4 |
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| 3 | Classification of the small scale multipath measurements and explain in detail about direct RE pulse system measurement with a block diagram? | Understand | 5 | | |
|---|---|--|---|--|--|
| | Explain in detail about spread spectrum channel impulse response | Understand | 5 | | |
| 4 | measurement system with a neat block diagram? | | - | | |
| | Explain in detail about frequency domain channel impulse response | Understand | 5 | | |
| 5 | measurement | | | | |
| | system with a neat block diagram? | | | | |
| | ASSIGNMENT-II | | | | |
| 6 | What are the parameters of mobile multipath channels? Write brief notes of | Understand | 6 | | |
| 0 | Picewas about small scale foding based on multipath delay spread in detail? | Understand | 6 | | |
| / | Discuss about small scale fading based on Donnlar spread in detail? | Understand | 0 | | |
| 8 | Discuss about small scale fading based on Doppler spread in detail? | Understand | 0 | | |
| | Simulation of clerk and Gans fading model using quadrature amplitude modulation with RE Doppler filter and baseband Doppler filter with near | Understand | 6 | | |
| 9 | diagram? | | | | |
| 10 | Explain about two-ray Rayleigh fading model? | Understand | 6 | | |
| 11 | Explain about the multipath shape factors for small scale fading in detail? | Understand | 6 | | |
| 12 | For a Rayleigh fading signal find | Remember | 5 | | |
| | a) Number of zero level crossings | | | | |
| | b) The average fade duration for threshold levels $\rho=0.1$ and $\rho=1$ when | | | | |
| | Doppler frequency is 20Hz. | | | | |
| 13 | For a Rayleigh fading signal find the average fade duration for threshold levels | Remember | 6 | | |
| | ρ =0.1 and ρ =1 when Doppler frequency is 30Hz. | | | | |
| | UNIT-IV | | | | |
| | EQUALIZATION AND DIVERSITY | | | | |
| S. No | Questions | Blooms Taxonomy Level | Course Outcome | | |
| | | | | | |
| 1 | What are the different receiver diversity combining techniques? Explain in detail. | Understand | 7 | | |
| 1 2 | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? | Understand Understand | 7 7 | | |
| $\begin{array}{c} 1 \\ \hline 2 \\ \hline 3 \end{array}$ | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? | Understand Understand Understand | 7 7 7 7 | | |
| 1 2 3 4 | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? | Understand Understand Understand Remember | 7 7 7 7 7 | | |
| 1 2 3 4 5 | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? | Understand Understand Understand Remember Understand | 7 7 7 7 7 7 7 | | |
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| $ \begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ \end{array} $ | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? | Understand Understand Understand Remember Understand Understand | 7 7 7 7 7 7 7 7 | | |
| $ \begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 2\\ \end{array} $ | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? Explain the structure of linear equalizer techniques in detail? | Understand Understand Understand Remember Understand Understand | 7 7 7 7 7 7 7 8 | | |
| $ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ 9$ | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? Explain the structure of linear equalizer techniques in detail? Explain the structure of nonlinear equalizer techniques in detail? | Understand Understand Understand Understand Understand Understand | 7 7 7 7 7 7 7 8 8 8 | | |
| $ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ \end{array} $ | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? Explain the structure of linear equalizer techniques in detail? Explain the structure of nonlinear equalizer techniques in detail? Derive the equation of maximul ratio combining improvement? | Understand Understand Understand Understand Understand Understand Understand Remember | 7 7 7 7 7 7 7 8 8 8 8 8 8 | | |
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| 1 2 3 4 5 6 7 8 9 10 11 12 13 S. No 1. 2. 3. 4. | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? Explain the structure of linear equalizer techniques in detail? Explain the structure of nonlinear equalizer techniques in detail? Derive the equation of maximul ratio combining improvement? Derive the equation of selection diversity improvement? Write the short notes on theoretical model for polarization diversity? Draw the neat block diagram of an M branch rake receiver implementation? Derive the equation of selection diversity improvement? UNIT-V WIRELESS NETWORKS What are the advantages and disadvantages of wireless local area networks? Explain ,when does a WLAN become a personal area network(PAN)? Determine the characteristics of HIPER LAN? What are the different topologies of wireless LAN? Explain in detail. | Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Understand Inderstand | 7 7 7 7 7 7 8 8 8 8 8 7 7 7 7 9 9 9 < | | |
| 1 2 3 4 5 6 7 8 9 10 11 12 13 S. No 1. 2. 3. 4. 5. | What are the different receiver diversity combining techniques? Explain in detail. Explain the algorithms for adaptive equalization ? Explain fundamental concept of equalization? Explain maximum likelihood sequence estimation(mlsc) equalizer? Explain a simplified communications system using an adaptive equalizer at the receiver with neat diagram? Discuss in detail about the categories of the practical space diversity considerations? Explain the structure of linear equalizer techniques in detail? Explain the structure of nonlinear equalizer techniques in detail? Derive the equation of maximul ratio combining improvement? Derive the equation of selection diversity improvement? Write the short notes on theoretical model for polarization diversity? Draw the neat block diagram of an M branch rake receiver implementation? Derive the equation of selection diversity improvement? UNIT-V WIRELESS NETWORKS What are the advantages and disadvantages of wireless local area networks? Explain ,when does a WLAN become a personal area network(PAN)? Determine the characteristics of HIPER LAN? What are the different topologies of wireless LAN? Explain in detail. Comparison between the IEEE 802.11 a,b,g and n standards? | Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Understand Understand Inderstand Remember Inderstand Inderstand | 7 7 7 7 7 7 8 8 8 8 8 7 7 7 7 9 <td< td=""></td<> | | |

| 6. | Explain in detail about wireless local loop? | Understand | 10 |
|----|--|------------|----|
| 7. | Discuss in detail about IEEE 802.11 medium access control? | Remember | 10 |

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