VELAMMAL INSTITUTE OF TECHNOLOGY, CHENNAI- 601204
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
ASSIGNMENT QUESTIONS

| Academic Year | $2017-2018$ |  |  |
| :--- | :--- | :--- | :--- |
| Batch | $2014-2018$ |  |  |
| Year/Semester/section | IV/VIII/A |  |  |
| Subject Code-Title | EC6801 WIRELESS COMMUNICATION |  |  |
| Name of the Faculty | Mrs.D.JEYAMANI LATHA | Dept | ECE |

Assignment No: 1 Total marks:20
Date of Issue: 03/01/18
Date of Submission: $\quad 10 / 01 / 18$

| $\begin{aligned} & \text { SI. } \\ & \text { No } \end{aligned}$ | Assignment Questions | K Level | CO | Marks |
| :---: | :---: | :---: | :---: | :---: |
| 1. | (a) Illustrate why or why not ,in the following cases ,whether the two ray model could be applied , and: $\text { Case(i): } \mathrm{h}_{1}=35 \mathrm{~m}, \quad \mathrm{~h}_{\mathrm{r}}=3 \mathrm{~m}, \quad \mathrm{~d}=250 \mathrm{~m}$ $\text { Case }(\mathrm{ii}) \mathrm{h}_{1}=30 \mathrm{~m} \quad, \mathrm{~h}_{\mathrm{r}}=1.5 \mathrm{~m}, \quad \mathrm{~d}=450 \mathrm{~m}$ <br> (b)Solve that in the two-ray ground reflected model, $\Delta=\mathrm{d}^{\prime \prime}-\mathrm{d}^{\prime}=2 \mathrm{~h}_{\mathrm{t}} \mathrm{~h}_{\mathrm{r}} / \mathrm{d}$ | Apply | CO1 | 5 |
| 2. | (a) Calculate the received power at a distance of 10 km , If a transmitter produces 50 W of power, which is applied to unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from the antenna. Assume unity gain for the receiving antenna. . <br> (b) Calculate the proper 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 $\mathrm{fc}=1900 \mathrm{MHz}$ and $\mathrm{v}=50 \mathrm{~m} / \mathrm{s}$. How long would it take to make these measurements, assuming they could be made in real from a moving vehicle? What is the Doppler spread $\mathrm{B}_{\mathrm{D}}$ for the channel? | Apply | CO1 | 5 |
| 3. | (a) Solve the optimal value of N for a cellular service provider decides to use a digital TDMA scheme which can tolerate a signal -tointerference ratio of 15 dB in the worst case. <br> (1) Omni directional antennas (2) $120^{\circ}$ sectoring <br> (3) $60^{\circ}$ sectoring <br> (4)Should sectoring be used? <br> If so, which case $\left(60^{\circ}\right.$ or $\left.120^{\circ}\right)$ should be used?(Assume a path loss exponent of $n=4$ and consider trunking efficiency) <br> (b) Construct the equitable distribution of control channels and voice channels in each cell of the three given systems.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(1)four cell reuse (2)seven cell reuse and(3) twelve cell reuse. If 1 MHz of the allocated spectrums is dedicated to control channels, | Apply | CO2 | 5 |


| 4. | (a) Solve for the number of simultaneous users that can be accommodated in GSM.Consider Global system for Mobile,which is a TDMA/FDD system that uses 25 MHz for the forward link, which is broken into radio channels of 200 MHz .If 8 speech signals are supported on a single radio channel and if no guard band is assumed <br> (b) Demonstrate (1)time duration of a bit(2)the time duration of a slot (3)the time duration of a bit and (4) how long must a user copying a single time slot wait between two successive transmission? If GSM uses a frame structure where each frame consists of eight time slots, and each time slot contains 156.25 bits , and data is transmitted at 270.833 kbps in the channel. | Apply | CO2 | 5 |  |
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| Assignment No: $2 \quad$ Total marks:20   <br> Date of Issue: $7 / 02 / 18$ Date of Submission: 15/02/18 |  |  |  |  |  |
| 1. | Demonsrtate the following for an Erlang C system that has a 5\% probability of a delayed call: <br> 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 $\lambda=1$ call/hour, [Data: from Erlang C chart,5\% probability of delay with $\mathrm{C}=15$,traffic intensity=9.0 Erlang] <br> (i) How many users per square kilometer will this system support/ <br> (ii) What is the probability that a delayed call will have to wait for more than 10 sec ? <br> (iii)What is the probability that a call will be delayed for more than 10 sec? | Understand | CO3 |  | 5 |
| 2. | Infer the power in each sideband. What percentage of the total power is in the carrier? If A zero mean sinusoidal message is applied to a transmitter that radiates an AM signal with 10 kW power. Compute the carrier power if the modulation index is 0.6 . | Understand | CO3 |  | 5 |
| 3. | Solve for the maximum Doppler shift ,the coherence time of the channel and the maximum number of symbols that could be transmitted without updating the equalizer , assuming that the symbol rate is 24.3 ksymbols/sec.Consider the design of the US Digital cellular equalizer, where $\mathrm{f}=900 \mathrm{MHz}$ and the mobile velocity $\mathrm{v}=80 \mathrm{~km} / \mathrm{hr}$. | Apply | CO 4 |  | 5 |
| 4. | Construct the probability that the SNR will drop below 10 dB ,If the average SNR is 20 dB ,.Compare this with the case of single receiver without diversity.Assume four branch diversity is used, where each branch receives an independent Rayleigh fading signal. | Apply | CO 4 |  | 5 |
| Assignment No: 3 Total marks:10  <br> Date of Issue: $21 / 02 / 18$ Date of Submission: 27/02/18 |  |  |  |  |  |
| 1 | Experiment with the Bit error rate of Wi Fi using MATLAB | Apply | CO6 |  | 5 |
| 2 | Experiment with the Bit error rate of Wi Max using MATLAB. | Apply | CO6 |  | 5 |



