KUMARAGURU
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Register Number: ……

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Seventh Semester

ELECTRONICS & COMMUNICATION ENGINEERING

ECE118: Wireless Communications

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The indoor radio channel differs from the traditional mobile channel in one aspect namely
   a) The signal level do not vary greatly depending on whether interior doors are open or closed
   b) the distances covered are much larger
   c) The propagation within the building is not strongly influenced by specific features such as layout of the building.
   d) the distances covered are much smaller
2. The gain of an antenna is related to its effective aperture A_e by
   a) $G = 2\pi A_e/ \lambda^2$
   b) $G = 4\pi A_e/ \lambda^2$
   c) $G = 6\pi A_e/ \lambda^2$
   d) $G = 8\pi A_e/ \lambda^2$
3. Bit error probability in QPSK is
   a) Identical to BPSK
   b) Twice that of BPSK
   c) Less than BPSK
   d) Greater than BPSK
4. OFDM used for wireless communication is a
   a) Narrow band scheme
   b) Medium band scheme
   c) Small band scheme
   d) Wide band scheme
5. Example of Block code is
   a) vertibi code
   b) Convolution code

c) Hamming code
d) Turbo code

6. Convolution code can be represented using
   a) Block diagram
   b) Syndrome diagram
   c) Cyclic diagram
   d) Trellis diagram

7. The name of linear equalizers is
   a) Decision feedback equalizer
   b) Maximum likelihood symbol detection
   c) Transversal filter
   d) Maximum likelihood sequence Estimation

8. The name of the diversity method used for fixed radio links which vary slowly with time is
   a) Selection
   b) Feedback
   c) Time
   d) polarization

9. In GSM the Base station subsystem provides and manages radio transmission paths between the mobile stations and the
   a) BSC
   b) MSC
   c) OSS
   d) NSS

10. The proprietary open wireless technology standard for exchanging data over short distances is
   a) Blue tooth
   b) Wi-Fi
   c) GSM
   d) WLAN

PART B (10 x 2 = 20 Marks)

11. Describe small scale propagation model.
12. Name the propagation model used for outdoor and also indicate the specific situation for each model.
13. What are the fundamental properties of GMSK modulation?
14. List any two combinations for 16 QAM.
15. Define hamming distance of a block code.
16. What are the advantages and disadvantages of low density parity check codes?
17. Briefly explain the principle behind the adaptive equaliser.
18. Draw the block diagram of RAKE receiver.
19. What are the applications of LEO satellites?
20. What type digital modulation is used in Blue tooth?

PART C (5 x 14 = 70 Marks)

21. a) (i) Analyse a two ray model and obtain the expression for the received power at a distance d from a transmitter and show that (7)

$$P_r = P_t G_t G_r h_t^2 h_r^2 / d^4$$

(ii) Describe the three basic mechanisms considered in radio propagation in ray optics. (7)

(OR)

b) (i) Analyse and find an expression of the n^{th} Fresnel zone circle denoted by r_n and can be expressed in terms of n,λ, $d_1$and d_2 . (7)

(ii) Describe types of small scale fading models. (7)

22. a) (i) Analyse and obtain for the M-ary PSK (10)

I) signal set expression $S_{M\text{-}PSK}$

In terms of E_s is the energy per symbol, $\Phi_1(t)$, $\Phi_2(t)$ is orthogonal basis signals

and

II) Power spectral density P_{MPSK} with rectangular pulses.

In terms of T_s - Symbol duration of an M-ary PSK ,T_b - Bit duration M-ary PSK,f_c - Carrier frequency

(ii) Compare QPSK signaling and Offset QPSK signaling. (4)

(OR)

b) (i) Analyse and obtain expression for average probability of bit error P_e for Direct sequence spread spectrum DS-SS system with K users. (10)

In terms of K- no of Users,N- chips per message,N_o - Noise spectral density E_b -Energy per bit.

(ii) Distinguish between direct sequence spread spectrum and Frequency hopping spread spectrum. (4)

23. a) Consider a (7,4) linear block code with the parity check matrix H given by

$$\begin{pmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{pmatrix}$$

Determine code word for this (7,4) code
Show that this code is a Hamming code.
Illustrate the relation between the minimum distance and structure of the parity check matrix H by considering the code word 0101100.

(OR)

b) (i) Draw the diagram of the ½ rate convolutional encoder with generator polynomials $g^{(1)}(D) = 1 + D$ $g^{(2)}(D) = 1 + D + D^2$ and compute the encoder for the input sequence 101101. (7)

(ii) What is meant by free distance of a convolutional code? How does it affect the no of errors that can be corrected and coding gain? (7)

24. a) (i) Analyse the weight vector update equation for the LMS algorithm. (10)

(ii) Compare the performance of LMS and RLS algorithms (4)

(OR)

b) Explain what is meant by diversity reception? What are the different types? What are its advantages in cellular communications?

25. a) (i) Describe the advantages and disadvantages of WLL. (7)

(ii) Draw the functional block of DECT system and explain its working principle. (7)

(OR)

b) (i) Explain the forward and reverse channel parameters in IS 95 CDMA (7)

(ii) Explain the GSM system architecture and give its protocol specifications. (7)

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