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15EC81

Eighth Semester B.E. Degree Examination, June/July 2019
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the advantages of OFDM for LTE. **(08 Marks)**

b. Explain flat LTE SAE architecture. **(08 Marks)**

OR

2 a. Explain the following in brief,
(i) Pathloss and Shadowing.
(ii) Angular Spread and coherence distance.
(iii) Doppler spread and coherence time. **(09 Marks)**

b. Explain with a neat diagram, adaptive modulation and coding. **(07 Marks)**

Module-2

3 a. With a neat block diagram, explain OFDM communication system. Also mention the need of timing and frequency synchronization. **(09 Marks)**

b. Explain SC-FDMA uplink transmitter with a neat figure. **(07 Marks)**

OR

4 a. Explain spatial diversity of multiple antenna techniques. **(08 Marks)**

b. Explain open-loop MIMO in spatial multiplexing. **(08 Marks)**

Module-3

5 a. Explain the LTE Radio Interference protocols. **(08 Marks)**

b. Explain the transport channels in LTE. **(08 Marks)**

OR

6 a. Explain the hierarchical channel structure of LTE. **(08 Marks)**

b. Explain briefly layer mapping and precoding in modulation mapping. **(08 Marks)**

Module-4

7 a. Explain uplink control information. **(08 Marks)**

b. Explain the types of uplink reference signals. **(08 Marks)**

OR

8 a. Briefly explain the function of H-ARQ feedback in Downlink and Uplink transmission. **(08 Marks)**

b. Explain in brief types of Random Access procedure in LTE. **(08 Marks)**

Module-5

9 a. Explain the main services and functions of PDCP sublayer for the user plane. **(08 Marks)**

b. Explain RRC states and its functions. **(08 Marks)**

OR

10 a. Explain mobility management over the S1 transfer. **(08 Marks)**

b. Explain three basic approaches to mitigate ICI in downlink. **(08 Marks)**

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15EC82

Eighth Semester B.E. Degree Examination, June/July 2019
Fiber Optics and Networks

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. With the help of neat diagram, explain the man blocks of an optical fiber communication link. **(10 Marks)**

b. Explain the advantages and disadvantages and applications of optical fiber communication system. **(06 Marks)**

OR

2 a. With the neat diagram, discuss the structure of single mode and multimode step index fiber with advantages for each type. **(08 Marks)**

b. A silica glass optical fiber has a core refractive index of 1.480 and the cladding refractive index of 1.460 (n_1 = 1.480, n_2 = 1.460) calculate critical angle, acceptance angle and numerical aperture and the number of guided modes at 1300mm if cone radius is 20μm. **(08 Marks)**

Module-2

3 a. Explain different absorption mechanisms in optical fibers. **(08 Marks)**

b. Explain linear and non–linear scattering losses in optical fibers. **(08 Marks)**

OR

4 a. Explain macro bending and micro bending losses with a neat diagram. **(06 Marks)**

b. Explain briefly about chromatic dispersion within an optical fiber. **(06 Marks)**

c. When the mean optical power launched into an 8 km length of fiber is 120 μw, the mean optical power at the fiber output is 0.3μw.
Determine :
i) The overall signal attenuation or loss in decibels thro' the fiber assuming that there are no connectors and splices.
ii) The signal attenuation per kilometer for the fiber. **(04 Marks)**

Module-3

5 a. Draw the diagram of a typical GaAlAs double Hetrostructure LED along with energy band diagram and refractive index profile and explain. **(10 Marks)**

b. Explain the terms :
i) Spontaneous emission
ii) Stimulated emission
iii) Quantum efficiency. **(06 Marks)**

OR

6 a. Explain Fabry–Perot resonator cavity of laser with a neat diagram. **(06 Marks)**

b. Briefly discuss the possible sources of noise in optical fiber receiver. **(06 Marks)**

c. A GaAs laser operating at 850nm Los 560μm length and refractive index n = 3.7. What are the frequency and over length spacing's? **(04 Marks)**

Module-4

7 a. Explain the operational principle and implementations of WDM with diagram. **(08 Marks)**

b. Explain polarization independent Isolator with a neat diagram. **(08 Marks)**

OR

8 a. Explain optical circulators and optical add/drop multiplexers in detail. **(06 Marks)**

b. Explain the amplification mechanism in EDFA amplifier with the help of energy band diagram. **(10 Marks)**

Module-5

9 a. Explain about synchronous networks with STS frame structure. **(08 Marks)**

b. Describe about internet protocol and in evolution over physical layer evolution and traffic flow pattern with relevant diagram. **(08 Marks)**

OR

10 a. Explain with neat diagrams, Wavelength convertible routing network architecture. **(08 Marks)**

b. Write short note on optical fiber access networks and local are networks. **(08 Marks)**

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15EC833

Eighth Semester B.E. Degree Examination, June/July 2019
RADAR Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With neat block diagram explain conventional pulse radar with a superheterodyne receiver. **(08 Marks)**

b. A ground based air-surveillance radar operates at frequency of 1300 MHz (L band). Its maximum range is 200nmi for the detection of a target with a radar cross section of one square meter ($\sigma = 1m^2$). Its antenna is 12m wide by 4m high, and the antenna aperture efficiency is $\rho_a = 0.65$. The receiver minimum detectable signal is $S_{min} = 10^{-13}$W. Determine the following:

i) Antenna effective aperture A_e (square meters) and antenna gain G in numerically and decibel.
ii) Peak transmitter power.
iii) Pulse repetition frequencies to achieve a maximum unambiguous range of 200nmi.
iv) Average transmitter power, if the pulse width is 2μs.
v) Duty cycle
vi) Horizontal beam width (in degrees). **(08 Marks)**

OR

2 a. Briefly describe the major areas of radar applications. **(08 Marks)**

b. Compute the following related to radar:

i) What should be the pulse repetition frequency of a radar in order to achieve maximum unambiguous range of 60nmi?
ii) How long does it take for the radar signal to travel out and back when the target is at the maximum unambiguous range?
iii) If radar has a peak power of 800kW, what is its average power? Choose pulse width 1.5μs. **(03 Marks)**

c. Explain basic principle of RADAR with neat block diagram. **(05 Marks)**

Module-2

3 a. Derive the modified RADAR equation interms of signal-to-noise ratio. **(08 Marks)**

b. Discuss briefly following types of signal losses in radar:

i) Microwave plumbing losses
ii) Antenna losses
iii) Signal-processing losses. **(08 Marks)**

OR

4 a. Make use of portion of radar receiver block diagram, discuss with necessary equation the probability of false alarm and probability of detection. **(08 Marks)**

b. Illustrate the concepts of pulse-repetition frequency and range ambiguities in case of radar. **(08 Marks)**

Module-3

5 a. With neat block diagram, explain how simple pulse radar extracts the Doppler frequency shaft of the echo signal from the moving target. Also derive the equation for Doppler frequency shift. **(08 Marks)**

b. Explain the working of digital Moving Target Indicator (MTI) Doppler signal processor with neat diagram. **(08 Marks)**

OR

6 a. Illustrate with neat block diagram single-delay line canceller. Also derive the expression for frequency response of single-delay line canceller. **(08 Marks)**

b. List the limitations of single delay line cancellers and derive its associated equations. **(08 Marks)**

Module-4

7 a. Define monopulse tracker. Using block diagram, explain amplitude comparision monopulse tracking radar in on one angle coordinates. **(08 Marks)**

b. With neat block diagram, explain conical scan tracking radar. **(08 Marks)**

OR

8 a. Discuss the concept of phase comparison monopulse. **(08 Marks)**

b. Compare monopulse and conical radar tracking system. **(08 Marks)**

Module-5

9 a. List the different functions served by radar antenna. **(08 Marks)**

b. What is the role of duplexer's in radar system? Illustrate the transmit condition and receive condition in case of balanced duplexer. **(08 Marks)**

OR

10 a. Explain different types of radar display system. **(08 Marks)**

b. List the advantages and limitations of electronically steered phase array antenna. **(08 Marks)**

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15EC834

Eighth Semester B.E. Degree Examination, June/July 2019
Machine Learning

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Describe the following problems with respect to tasks, performance and experience :
i) A checkers learning problem
ii) A handwritten recognition learning problem
iii) A robot driving learning problem. **(07 Marks)**

b. Write candidate elimination algorithm and illustrate with example. **(09 Marks)**

OR

2 a. Explain the steps in designing learning systems in detail. **(06 Marks)**

b. Write FIND-S algorithm and explain by taking EnjoySport concept and training instance given below :

Example	SKY	Air Temp	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

Module-2

3 a. What is decision tree and discuss the use of decision tree for classification problem. **(08 Marks)**

b. Describe the ID3 algorithm for decision tree learning with example. **(08 Marks)**

OR

4 a. Explain the concept of a perceptron with neat diagram. **(08 Marks)**

b. How a single perceptron can be used to represent the Boolean functions such as AND, and OR. **(08 Marks)**

Module-3

5 a. Define Bayesian theorem and Maximum A Posteriori (MAP) hypothesis. **(04 Marks)**

b. Derive an equation for MAP hypothesis using Bayes theorem. **(05 Marks)**

c. Consider a medical diagnosis problem in which there are two alternative hypothesis :
i) That the patient has a particular form of cancer (+) and
ii) That the patient does not (–). A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire populations have this cancer. Determine whether the patient has cancer or not using MAP hypothesis. **(07 Marks)**

OR

6 a. Describe Brute – Force MAP learning algorithm. **(04 Marks)**

b. Discuss the Naive Bayees classifier. **(04 Marks)**

c. The following table gives data set about stolen vehicles. Using Naïve bayes classifier classify the new data (RED, SUV, Domestic).

Colour	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	Suv	Imported	No
Yellow	Suv	Imported	Yes
Yellow	Suv	Domestic	No
Red	Suv	Imported	No
Red	Sports	Imported	Yes

(08 Marks)

Module-4

7 a. Discuss the K-nearest neighbor learning. **(04 Marks)**

b. Discuss locally weighted regression. **(04 Marks)**

c. Explain the CADET system using case based reasoning. **(08 Marks)**

OR

8 a. Define the following terms with respect to K-nearest neighbor learning.
i) regression ii) residual iii) kernel function. **(03 Marks)**

b. Explain radial basis functions. **(05 Marks)**

c. Explain the FOIL algorithm. **(08 Marks)**

Module-5

9 a. What is reinforcement learning and explain the reinforcement learning problem with neat diagram. **(06 Marks)**

b. Briefly discuss the FOCL algorithm with example. **(10 Marks)**

OR

10 a. Write the reinforcement problem characteristics. **(06 Marks)**

b. Explain the Q-function and Q-learning algorithm assuming deterministic reward and action with example. **(10 Marks)**

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