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15EC81

Eighth Semester B.E. Degree Examination, Aug./Sept. 2020 Wireless Cellular and LTE 4G Broadband

Time: 3 hrs.

Max. Marks: 80

Note : i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss the key enabling technologies used in LTE design. (08 Marks)
b. Explain with a neat diagram, how 3 GPP network evolved towards flat LTE – SAE architecture. (04 Marks)
c. Give a brief description of evolved packet core architecture. (04 Marks)
- 2 a. Explain the cellular concept briefly. Discuss how interference can be reduced in cellular communication. (08 Marks)
b. What are the techniques used for mitigating broad band fading? Explain. (08 Marks)

Module-2

- 3 a. Briefly explain the different multiple access system which can be implemented with OFDM. (08 Marks)
b. Discuss the significance of PAR problem in LTE. Briefly explain PAR reduction technique. (08 Marks)
- 4 a. With a neat diagram, explain SC–FDMA. List out the advantages and disadvantages SC–FDM. (08 Marks)
b. Explain open loop MIMO with a neat sketch. (08 Marks)

Module-3

- 5 a. Discuss the basic design principles followed in designing LTE specifications. (06 Marks)
b. Explain the different logical channels supported in LTE. (06 Marks)
c. With a neat diagram, explain briefly the frame structures used in LTE. (04 Marks)
- 6 a. Briefly explain downlink transport channel processing. (08 Marks)
b. Explain the different physical signals in down link. (08 Marks)

Module-4

- 7 a. Discuss the uplink Control Information (uCI) which will assist physical layer procedures. (08 Marks)
b. Briefly explain Random Access Preamble formats. (08 Marks)

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- 8 a. Explain Channel Quality Indicator (CQI) feedback by describing CQI estimation and different reporting modes. (08 Marks)
b. Discuss the power control schemes used in LTE. (08 Marks)

Module-5

- 9 a. Explain the main services and functions of PDCP sublayer. (08 Marks)
b. What are the different modes of operations of RLC entity? (04 Marks)
c. Briefly explain ARQ procedures in LTE. (04 Marks)
- 10 a. With a neat flow diagram explain mobility management over S1 interface. (08 Marks)
b. Discuss intra – LTE and inter – RAT mobility briefly. (03 Marks)
c. Explain the approaches to mitigate Inter Cell Interference (ICI) in the down link. (05 Marks)

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15EC82

Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Fiber Optics and Networks

Time: 3 hrs.

Max. Marks: 80

- Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

- 1 a. Explain Optical Fiber transmission link with suitable block diagram. (06 Marks)
b. Discuss classification of Optical Fiber depending on Refractive Index profile, mode of operation and material used. (06 Marks)
c. Find Numerical aperture and number of propagation modes for a step index fiber with indices 1.5 and 1.48 with core radius 25 μm . If the wavelength of the optical signal propagating in the fiber is 1300 nm. (04 Marks)
- 2 a. What are the different types of materials used for fabrication of optical fiber and their requirements? (06 Marks)
b. Explain Index-guiding photonic crystal fiber with suitable diagram. (04 Marks)
c. Discuss Ray Theory model for multimode step index and graded index fiber. (06 Marks)

Module-2

- 3 a. Explain the different mechanism caused by absorption loss. (05 Marks)
b. The Input power to an optical fiber is 2 mW while the power measured at the output end is 2 μW . If the fiber attenuation is 0.5 dB/km, calculate the length of the fiber. (05 Marks)
c. What are the different types of bending losses in fiber and explain with suitable diagram. (06 Marks)
- 4 a. Explain the different types of mechanical misalignment between two fibers. (05 Marks)
b. What are the different types of splicing and explain V-groove optical fiber splicing technique. (05 Marks)
c. What are the principles of good connector design. (06 Marks)

Module-3

- 5 a. Explain Electron recombination and the associated photon emission for Direct and Indirect bandgap materials. (06 Marks)
b. With schematic explain high-radiance surface emitting LED. (06 Marks)
c. A double-heterojunction InGaAsP LED emitting at a peak wavelength of 1310 nm has radiative and non-radiative recombination time of 30 ns and 100 ns respectively. The drive current is 40 mA calculate internal efficiency and optical power generated internally to the LED. Assume $h = 6.6256 \times 10^{-34}$ J-s ; $Q = 1.602 \times 10^{-9}$ C. (04 Marks)

OR

- 6 a. Explain the three key transition process involved in laser action. (04 Marks)
b. Explain Reach-Through avalanche photodiode with neat diagram. (06 Marks)
c. With schematic explain reverse biased pin photodiode. (06 Marks)

Module-4

- 7 a. Explain the implementation of WDM networks with various types of optical amplifiers. (06 Marks)
b. With layout explain 2×2 Mach-Zehnder Interferometer. (04 Marks)
c. Explain Design and operation of a Polarization-Independent Isolator. (06 Marks)
- 8 a. Explain MEMS actuation method with neat diagram. (04 Marks)
b. Explain 4×4 OADM with miniature switching mirrors. (06 Marks)
c. Explain the Basic operation of a generic optical amplifier. (06 Marks)

Module-5

- 9 a. Explain IPV6 packet with extension header. (06 Marks)
b. Explain ATM Protocol Architecture. (04 Marks)
c. Explain the Basic operation of long-haul circuit switching Telecommunication Networks. (06 Marks)
- 10 a. Explain Optical-cross connect architecture using optical space switches. (08 Marks)
b. Explain Generic Structure of an optical burst switching networks. (08 Marks)

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15EC833

Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Radar Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

- 1 a. Explain the basic principle of Radar. (04 Marks)
b. Derive simple form of Radar range equation. (08 Marks)
c. Define the following terms used in Radar: i) Duty cycle ii) Average power. (04 Marks)
- 2 a. Explain block diagram of a Radar with a neat diagram and explain each block. (08 Marks)
b. Explain the various applications of Radar. (06 Marks)
c. Write a brief note on maximum unambiguous range R_{un} . (02 Marks)

Module-2

- 3 a. Define noise figure of receiver and prove that $R_{max}^4 = \frac{P_t G A_e \sigma}{(4\pi)^2 k T_o B F_n (S/N)_{min}}$ (10 Marks)
b. Write a brief note on pulse repetition frequency. (06 Marks)
- 4 a. Briefly explain various radar system losses. (10 Marks)
b. Write a brief note on Envelope detector. (06 Marks)

Module-3

- 5 a. With a neat block diagram, explain simple CW Doppler radar. Also mention the advantages and disadvantages. (08 Marks)
b. Explain with a neat block diagram the working of a digital MTI doppler signal processor. (08 Marks)
- 6 a. With a block diagram, explain the working of MTI radar with power amplifier transmitter. (08 Marks)
b. With a neat block diagram, explain Moving Target Detector [MTD]. (08 Marks)

Module-4

- 7 a. Explain the types of Tracking Radar systems. (08 Marks)
b. Explain the block diagram of conical scan tracking radar. (08 Marks)
- 8 a. With a neat diagram, explain sequential lobing and conical scan. (08 Marks)
b. Explain the block diagram of amplitude comparison monopulse tracking radar for a single angular coordinate and explain its operation. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-5

- 9 a. What are the functions of the radar antenna? (04 Marks)
b. Explain the following antenna parameters:
i) Directive Gain (04 Marks)
ii) Effective aperture. (08 Marks)
c. Write a brief note on radar displays. (08 Marks)
- 10 a. Write short note on: Superheterodyne receiver. (08 Marks)
b. Write short note on: Reflector antennas. (08 Marks)

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15EC834

Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Machine Learning

Time: 3 hrs.

Max. Marks: 80

- Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1. a. Define machine learning. Describe the steps in designing learning system. (08 Marks)
b. Write candidate-elimination algorithm and illustrate with an example. (08 Marks)
2. a. Describe FIND-S algorithm. Explain it by considering the training instance of Enjoy Sport given in Table.Q2(a).

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

Table.Q2(a)

(10 Marks)

- b. Describe the following problems with respect to tasks, performance and experience.
 - (i) A checkers learning problem
 - (ii) Hand-written recognition learning problem
 - (iii) A robot driving learning problem. (06 Marks)

Module-2

3. a. With the help of an example, describe ID3 algorithm for decision tree learning. (08 Marks)
b. What is decision tree? Describe its use for classification with an example. (08 Marks)
4. a. For the transaction shown in the Table.Q4(a), compute:
 - (i) Entropy of the collection of transaction records of table with respect to classification.
 - (ii) What are the information gain of a_1 and a_2 relative to the transactions of the table?

Instance	1	2	3	4	5	6	7	8	9
a_1	T	T	T	F	F	F	F	T	F
a_2	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-

the Table.Q4(a)

(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. Briefly describe the Bayes theorem and maximum a posteriori (MAP) hypothesis. (04 Marks)
b. Derive equation for MAP hypothesis using Bayes theorem. (04 Marks)
c. Consider a football game between two rival teams: Team0 and Team1. Suppose Team0 wins 95% of the time and Team1 wins the remaining matches. Among the games won by team0, only 30% of them come from playing on team '1's football field. On the other hand, 75% of the victories for team1 are obtained while playing at home. If team1 is to host the next match between the two teams, which team will most likely emerge as the winner? (08 Marks)

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- 6 a. Explain Naïve Bayes classifier and Bayesian belief networks. (10 Marks)
b. Show that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between actual output hypothesis and predicted output hypothesis. (06 Marks)

Module-4

- 7 a. Explain CADET system using case based reasoning. (08 Marks)
b. Explain K-nearest neighbor algorithm. (05 Marks)
c. Define the following terms with respect to K-nearest neighbor learning:
(i) Regression
(ii) Residual
(iii) Kernel function (03 Marks)
- 8 a. Explain FOIL algorithm. (08 Marks)
b. Briefly describe locally weighted regression. (04 Marks)
c. Explain radial basis functions. (04 Marks)

Module-5

- 9 a. Explain FOCL algorithm with an example. (10 Marks)
b. Explain reinforcement learning problem with necessary diagram. (06 Marks)
- 10 a. Explain Q-learning algorithm assuming deterministic reward and action with example. (10 Marks)
b. List the reinforcement problem characteristics. (06 Marks)

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15TE835

Eighth Semester B.E. Degree Examination, Aug./Sept. 2020 Ad-hoc Wireless Networks

Time: 3 hrs.

Max. Marks: 80

- Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Differentiate between cellular network and Ad-hoc network. (10 Marks)
b. Explain wireless sensor networks. (06 Marks)
- 2 a. Explain the issues in MAC protocol. (08 Marks)
b. Explain Ad-hoc wireless internet with a neat block diagram. (08 Marks)

Module-2

- 3 a. Explain collision avoidance time allocation protocol. (08 Marks)
b. Explain distributed priority scheduling protocol. (08 Marks)
- 4 a. Explain directional busytone based MAC protocol. (08 Marks)
b. Explain power control MAC with a neat diagram. (08 Marks)

Module-3

- 5 a. Explain the characteristics of an ideal routing protocol for Ad-hoc wireless networks. (08 Marks)
b. Explain Ad-hoc on-demand distance vector protocol. (08 Marks)
- 6 a. Describe the classification of routing protocols with a neat diagram. (08 Marks)
b. Explain Fisheye state routing protocol. (08 Marks)

Module-4

- 7 a. Explain the issues in designing a transport layer protocol for Ad-hoc wireless networks. (08 Marks)
b. Why does TCP not perform well in ad-hoc wireless networks. (08 Marks)
- 8 a. Explain split TCP. (08 Marks)
b. Tabulate the comparison of TCP solutions for Ad-hoc wireless network. (08 Marks)

Module-5

- 9 a. Explain different network security attacks. (08 Marks)
b. Explain symmetric key algorithms. (08 Marks)

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