USN | | | | | | | | | | 　　　　　　　　　　　　　　　　**17EC81**

Eighth Semester B.E. Degree Examination, July/August 2021
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions.*

1　a. Explain the advantages of OFDM leading to its selection for LTE. (08 Marks)
　b. Explain adaptive modulating and coding with neat block diagram. (08 Marks)
　c. Explain briefly path loss. (04 Marks)

2　a. Explain with neat block diagram flat LTE SAE architecture. (08 Marks)
　b. Explain delay spread and coherence bandwidth. (08 Marks)
　c. Mention advantages and disadvantages of cell sectoring in cellular wireless communications. (04 Marks)

3　a. Explain the basic multicarries transmitter and receiver with neat block diagram. (08 Marks)
　b. Explain the principle of operation of OFDM downlink transmitter with neat sketch. (08 Marks)
　c. Mention the differences between V-BLAST and D-BLAST encoding techniques. (04 Marks)

4　a. Explain peak to average power ratio (RAR). (08 Marks)
　b. Explain SC-FDMA uplink transmitter and receiver with neat block diagram. (08 Marks)
　c. Compare OFDM and SCFDE. (04 Marks)

5　a. Explain uplink and downlink transport channels. (08 Marks)
　b. Explain frame structures used in LTE. (08 Marks)
　c. Explain Broadcast channel used in LTE. (04 Marks)

6　a. Explain LTE end to end network architecture with neat block diagram. (08 Marks)
　b. With neat block diagram explain radio interface protocols stack. (08 Marks)
　c. Explain uplink transport channels. (04 Marks)

7　a. Explain the types of uplink reference signals. (08 Marks)
　b. With neat block diagram, explain the uplink transport channel processing. (08 Marks)
　c. Explain buffer status reporting in uplink. (04 Marks)

8　a. Explain with neat sketch cell search procedure used in LTE. (08 Marks)
　b. Explain random access procedure used in LTE. (08 Marks)
　c. What is meant by periodic and aperiodic reporting in CQI feedback? (04 Marks)

9　a. Explain RRC states and function with neat sketch. (08 Marks)
　b. Explain mobility management over X2 mobility with neat sketch. (04 Marks)
　c. Explain data transfer modes. (08 Marks)

10　a. Explain RAN procedure for mobility. (08 Marks)
　b. Explain the main services and function of RLC and MAC layers. (08 Marks)
　c. Explain paging used in RRC protocol. (04 Marks)

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17EC82

Eighth Semester B.E. Degree Examination, July/August 2021
Fiber Optics and Networks

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Outline any light advantages of optical fibers over copper wires or coaxial cables that are used in communication links as transmission media. **(08 Marks)**

 b. Define Numerical Aperture(NA) and what is its significance. With an optical ray diagram and by derivation relate NA and core-cladding refractive indices as well as NA and relative refractive index Δ. **(08 Marks)**

 c. With a simple block diagram, briefly explain the digital optical communication link that employs optical fiber. **(04 Marks)**

2 a. With neat sketches of the refractive index profile and light ray transmissions, explain the features of : i) multimode step index fiber ii) single mode step index fiber iii) multimode graded index fiber (parabolic RI profile). **(11 Marks)**

 b. A multimode step index fiber with core diameter of 80μm and a relative index difference of 1.5% is operating at a wave length of 0.85μm. If core RI is 1.48, find :
 i) the normalized frequency (or V number for the fiber) ii) the number of modes guided by the fiber. **(04 Marks)**

 c. Compare the meridional optical rays and skew optical rays in an optical fiber. **(05 Marks)**

3 a. The mean optical power launched into a fiber of length 8kms is 120 μW and the mean optical power at the fiber output end is 3 μW. Find :
 i)   The overall signal attenuation in dB without any connectors or splices.
 ii) The signal attenuation per kilometer for the fiber
 iii) The overall signal attenuation for a 10 km optical link using the same type of fiber with splices at 1 km intervals, each giving an attenuation of 1dB. **(06 Marks)**

 b. Explain the phenomena of : i) material absorption and ii) linear scattering in optical fibers that lead to losses of optical signals. **(10 Marks)**

 c. With a neat diagram, explain the technique of fusion splice for optical fibers. **(04 Marks)**

4 a. Outline any six principal feature requirements of a good optical fiber connector. **(06 Marks)**

 b. With a neat diagram of illustrative schematic, briefly explain the basic principle of operation and three advantages of expanded beam connectors. **(07 Marks)**

 c. A 32 × 32 port multimode fiber transmissive star coupler has 1mW of optical power launched into a single input port. The average optical power at each output port is 14μW. Find the total loss incurred by the star coupler and the average insertion loss through the coupler. **(07 Marks)**

5 a. With a neat schematic explain the structure and features of a high radiance surface emitting LED. **(08 Marks)**

 b. Explain briefly the three key photon transition processes involved in laser action. **(03 Marks)**

 c. Show the derivation of the mathematical expression that estimates the amount of photon emissions per unit volume, starting from the two rate equations of laser diode. **(09 Marks)**

6 a. With relevant diagrams, explain the principles of conversion of optical signal into electrical signal by a PIN photodatector. **(08 Marks)**

 b. What are the three principal noises associated with photodetectors? Briefly explain how they originate. **(06 Marks)**

 c. Explain the operation of a digital optical receiver with a block diagram showing basic sections. **(06 Marks)**

7 a. With a neat block diagram, explain the operational principles and implementation of a WDM optical network. **(06 Marks)**

 b. Explain the construction and working of an optical isolator. **(06 Marks)**

 c. Based on the general applications, explain the three types of optical amplifiers with relevant block diagrams. **(08 Marks)**

8 a. Explain the construction and working of a dielectric thin film optical filter. **(06 Marks)**

 b. With relevant diagrams, explain the construction and operation of reflection and transmission type diffraction gratings. **(08 Marks)**

 c. With neat diagram, explain the operation of a MEMS technology based actuation mechanism. **(06 Marks)**

9 a. With a neat diagram, explain the optical public telecommunication network hierarchy. **(07 Marks)**

 b. With neat diagram, explain the optical circuit switched network. **(06 Marks)**

 c. Briefly explain each of the seven layers of OSI reference model. **(07 Marks)**

10 a. What are the four basic functions performed by an optical packet switch? Show the overall structural format of a typical packet used in the optical packet switched network and briefly explain. **(07 Marks)**

 b. Show the structure of a metropolitan area network and explain. **(06 Marks)**

 c. With a neat block diagram, briefly explain the generic Optical Label Switched (OLS) network configuration. **(07 Marks)**

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Eighth Semester B.E. Degree Examination, July/August 2021
Radar Engineering

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain basic principle of radar with suitable diagrams. **(10 Marks)**
 b. Explain maximum unambiguous range of a radar with equation and graph. **(10 Marks)**

2 a. A 10GHz radar has the following characteristics P_t = 250KW, PRF = 1500PPS, pulse width = 0.8µs, Power gain of antenna = 2500, S_{min} = 10^{-14}W, A_e = $10m^2$, σ = $2m^2$. Find : i) Runamb ii) Maximum possible range iii) Duty cycle iv) Average power. **(10 Marks)**
 b. Briefly describe the major areas of radar applications. **(10 Marks)**

3 a. Derive the modified radar equation interms of signal to noise ratio. **(10 Marks)**
 b. Explain the radar cross section of sphere and cone sphere targets. **(10 Marks)**

4 a. Discuss with equation and graphs the probability of false alarm and the probability of detection using a envelope detector. **(10 Marks)**
 b. Discuss briefly the following types of system losses in radar
  i) Microwave plumbing losses
  ii) Antenna losses
  iii) Signal processing losses. **(10 Marks)**

5 a. Explain the working of digital Moving Target Indicator (MTI) doppler signal processor with neat diagram. **(10 Marks)**
 b. List the limitations of single delay line cancellers and derive its associated equations. **(10 Marks)**

6 a. With neat block diagram, explain the original Moving Target Detector (MTD) signal processor. **(10 Marks)**
 b. Derive the equations for clutter attenuation and MTI improvement factor. **(10 Marks)**

7 a. Define monopulse tracker. Using block diagram explain amplitude comparison monopulse tracking radar for a single angular coordinate. **(10 Marks)**
 b. With neat block diagram, explain conical scan tracking radar. **(10 Marks)**

8 a. What are the different types of tracking radar systems? Explain with diagrams, how angle tracking is done. **(10 Marks)**
 b. Discuss on tracking in range of a tracking radar with suitable waveforms and equations. **(10 Marks)**

9 a. List the different functions served by radar antenna. **(10 Marks)**
 b. Explain different types of radar display system. **(10 Marks)**

10 a. List the advantages and limitations of electronically steered phase array antenna. **(10 Marks)**
 b. What is the role of duplexer's in radar system? Illustrate the transmit condition and receive condition in case of balanced duplexer. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, July/August 2021
Network and Cyber Security

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a. Discuss the secure socket layer Architecture.   (08 Marks)
    b. Explain the connection state parameters.   (08 Marks)
    c. Mention the elements of the communication are encrypted when HTTPS is used.   (04 Marks)

2   a. Explain the SSH transport Layer Packet Exchange with
        i) Connection Via TCP
        ii) Connection Via SSH tunnel.   (10 Marks)
    b. Discuss the steps involved for message exchange and Authentication methods.   (10 Marks)

3   a. Mention the reasons for widely used PGP.   (08 Marks)
    b. What are the limitations of SMTP?   (08 Marks)
    c. What are the Five headers fields defined in MIME?   (04 Marks)

4   a. Draw the block diagram of internet mail architecture and mention the function of each key
       component.   (10 Marks)
    b. Write the Function Flow diagram of DKIM and explain it.   (10 Marks)

5   a. Discuss the Applications of IP Security.   (08 Marks)
    b. Explain the IP security processing model for outbound packets.   (08 Marks)
    c. Mention the services provided by RFC 4301.   (04 Marks)

6   a. Draw the block diagram of IP Security Architecture and explain it.   (10 Marks)
    b. Explain Internet Key Exchange Header format and Generic Payload header.   (10 Marks)

7   a. Compare Virus and Worms.   (04 Marks)
    b. Explain Antipattern based signature based Malware Detection versus polymorphic Threats.
                                                                                        (08 Marks)
    c. Discuss the primal design forces in the cyber security domains.   (08 Marks)

8   a. Explain the heading fields and body fields in the full cyber antipattern template. (10 Marks)
    b. Explain the following cyber security Antipattern catalogs.
        i) Unpatched Applications
        ii) Webify Everything   (10 Marks)

9   a. Explain Architectural problem solving pattern.   (10 Marks)
    b. Discuss Minipattern for problem solving meetings.   (10 Marks)

10 a. Discuss the list of typical re-imaging sequence for the window operating systems. (10 Marks)
    b. Explain the typical installation sequence for a sliding – rails rack server.   (10 Marks)

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