Eighth Semester B.E. Degree Examination, June/July 2018
Wireless Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1. a. Describe the characteristics of 2G and 3G cellular systems. **(10 Marks)**
   b. Explain with a neat flow diagram AMPS mobile originated call. **(10 Marks)**

2. a. With a neat block diagram, explain the functions performed by various blocks of a subscriber device. **(10 Marks)**
   b. Define and explain the generation of IMSI, IMEI and CGI. **(10 Marks)**

3. a. Explain capacity expansion techniques:
   (i) Cell splitting
   (ii) Cell sectoring
   (iii) Overlaid cells **(10 Marks)**
   b. Explain the concept of frequency reuse for cellular system. For a mobile system of cluster size of 7, determine the frequency reuse distance if the cell radius is 5 km. Repeat the calculation for a cluster size of 4. **(10 Marks)**

4. a. With a neat sketch, explain GSM signaling model. **(10 Marks)**
   b. Explain the various logical channels used in GSM. **(10 Marks)**

PART – B

5. a. Explain GSM Inter-BSC handover operation with a neat diagram. **(10 Marks)**
   b. With a neat block diagram, explain the generation of CDMA reverse access channel. **(10 Marks)**

6. a. Explain with block diagram the generation of CDMA forward traffic control with power control for 14.4 kbps traffic. **(10 Marks)**
   b. Describe the soft handoffs process in CDMA. **(10 Marks)**

7. a. Explain convolutional and turbo encoders. **(06 Marks)**
   b. Discuss path loss model. **(04 Marks)**
   c. Explain with a neat block diagram RAKE receiver. **(10 Marks)**

8. a. What are the IEEE 802.11 extensions? **(06 Marks)**
   b. Describe the blue tooth protocol stack with relevant figures. **(08 Marks)**
   c. Depict the relationship between IEEE 802.11 sending and receiving station with a state diagram. **(06 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
Optical Networking

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   With the help of a diagram, explain the different parts of a public networks.   **(06 Marks)**
    b.   With the help of diagrams, explain the evaluation of optical transmission system.   **(10 Marks)**
    c.   Briefly explain solitons.   **(04 Marks)**

2   a.   With the help of diagrams, explain the principle of operation of Isolators and circulators.
                                                                                       (10 Marks)
    b.   Explain multilayer, dielectric Thin film filter and show how the same filter can be used as multiplxer and Demultiplexer.   **(10 Marks)**

3   a.   What are the main considerations in building large switches? Compare the different types of switch architectures.   **(10 Marks)**
    b.   Explain the principle of operation of EDFA's and explain how gain flatness can be achieved.
                                                                                       (10 Marks)

4   a.   With the help of a block diagram, explain various components of WDM link.   **(08 Marks)**
    b.   Explain in brief the following :
         i)   Power penalty
         ii)   Transmitter
         iii) Receiver.   **(06 Marks)**
    c.   Describe in detail the interchannel and intrachannel crosstalk.   **(06 Marks)**

PART – B

5   a.   With the neat diagram explain the different elements of a SONET/SDH infrastructure.
                                                                                       (10 Marks)
    b.   Explain a layered view of network consisting of a second generation optical network layer and also explain with Figure the four sub layers of SONET/SDH layers.   **(10 Marks)**

6   a.   What are the different types of wavelength conversion techniques in a wavelength add/drop multiplexer, explain with neat sketch.   **(10 Marks)**
    b.   Explain the features of optical layers.   **(10 Marks)**

7   a.   Explain combined SONET/WDM Network design problem.   **(10 Marks)**
    b.   Explain the different types of protection techniques for point to point links that comes under fault management.   **(10 Marks)**

8   a.   Explain synchronization   **(10 Marks)**
    b.   Explain OTDM   **(10 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
Digital Switching System

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a. Explain briefly the different network structures used in communication system. **(08 Marks)**
     b. A four-wire circuit has an overall loss [two-wire to two wire) of 1 dB and the balance return loss at each end is 6 dB. Find:
        i)   The singing point
        ii) The stability margin
        iii) The attenuation of talker and listener echo. **(04 Marks)**
     c. Explain the principle operation of time-division multiplexing transmission system. **(08 Marks)**

2   a. Explain the working of distribution frames in strowger exchange. **(10 Marks)**
     b. Draw the block diagram of central office linkage and explain individual blocks. **(10 Marks)**

3   a. Starting from basic principle, derive an expression for the second Erlang's distribution. **(10 Marks)**
     b. What is congestion? Discuss briefly. **(06 Marks)**
     c. On average, one call arrives every 5 seconds. During a period of 10 seconds what is the probability that (i) No call arrives   (ii) One call arrives   (iii) Two call arrives (iv) more than two call arrives. **(04 Marks)**

4   a. Design a progressive grading system connecting 20 outgoing trunks and having switches with availability of 10. Draw the grading diagram. **(10 Marks)**
     b. Draw and explain two stage switching network and design a two stage switching network for connecting 200 incoming and 200 outgoing trunks. **(10 Marks)**

PART – B

5   a. Draw and discuss space switch diagram with K incoming and m outgoing PCM highways. **(08 Marks)**
     b. A T-S-T network has 20 incoming and 20 outgoing PCM highway, each conveys 30 channels. The required grade of service is 0.01, 0.02, 0.001, 0.005. Find the traffic capacity of network in mode 1 and mode 2. **(06 Marks)**
     c. Explain the frame alignment of PCM signals entering a digital exchange. **(06 Marks)**

6   a. Draw and explain the basic software architecture of a digital switching system. **(10 Marks)**
     b. Explain flow diagram using three modes of operation. **(10 Marks)**

7   a. Draw and explain the block diagram of interfaces of a typical digital switching system central office. **(10 Marks)**
     b. Discuss briefly: i) Firm ware-software coupling
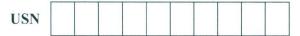   ii) Switching system-maintainability metrics. **(10 Marks)**

8   a. Explain generic switch software architecture. **(10 Marks)**
     b. Discuss common characteristics of digital switching systems. **(10 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
GSM

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a. With a neat block diagram, explain the mapping of GSM onto OSI layers.   **(10 Marks)**
    b. What are the GSM PLMN services and objectives? Explain in detail.   **(07 Marks)**
    c. Write a short note on MS subsystem.   **(03 Marks)**

2   a. Explain how smart antenna is used to reduce the interference in GSM. Mention their advantages.   **(08 Marks)**
    b. Explain the following radio link features of GSM :
       i) Discontinuous Transmission (DTx)   ii) Slow Frequency Hopping (SFH).   **(12 Marks)**

3   a. Explain the logical channel structure of GSM system.   **(08 Marks)**
    b. Name the various bursts used in GSM. Explain with the help of a neat diagram.   **(08 Marks)**
    c. With the flow diagram, describe the mobile identification.   **(04 Marks)**

4   a. List the speech coding methods and explain the attributes of Speech codec.   **(08 Marks)**
    b. Briefly explain the LPAS.   **(06 Marks)**
    c. With a neat diagram, explain GSM full rate LPC – RPE vocoders.   **(06 Marks)**

PART – B

5   a. Explain message flow diagram for call setup by mobile station.   **(10 Marks)**
    b. Describe Intra – MSC handover in GSM.   **(10 Marks)**

6   a. Briefly explain the wireless security requirements in GSM.   **(08 Marks)**
    b. Explain the security algorithms for GSM.   **(06 Marks)**
    c. With a neat call flow diagram, explain token based registration in GSM.   **(06 Marks)**

7   a. Write short notes on Teletraffic models.   **(06 Marks)**
    b. Describe the factors to be considered while designing a wireless system.   **(06 Marks)**
    c. Design a TDMA frame for a cellular system to support various bit rates from 8 kbps to 128 kbps. A user can be assigned multiple carriers (not more than 2). Assume GMSK modulation , a coding rate of R_C = one – half, frame efficiency of 75% and the symbol rate of the SACCH – a_1 = 0.1 R_s. The cell radius is limited to 5 km and maximum processing delay to 90 ms. The velocity of light is C = 3×10^8 mps.   **(08 Marks)**

8   a. Explain the management requirements for wireless network.   **(10 Marks)**
    b. Explain SNMP and OSI system management.   **(10 Marks)**

*****

Eighth Semester B.E. Degree Examination, June/July 2018
Network Security

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. List the examples of security attacks each of which has a risen in a number of real world cases. **(04 Marks)**
   b. Give the table showing the relationship between security services and mechanism. **(08 Marks)**
   c. Explain Gate keeper function with network access security model. **(08 Marks)**

2 a. Describe block cipher modes of operation in detail. **(10 Marks)**
   b. Draw the single round of DES algorithm and explain the process. **(10 Marks)**

3 a. User A and B use D-H algorithm with a common prime q = 71 and primitive root α = 7.
      i) If user A has private key $X_A = 5$, what is A's public key Y_A?
      ii) If user B has private key $X_B = 12$, what is B's public key Y_B?
      iii) What is shared secret key K_A and K_B? **(03 Marks)**
   b. Perform encryption and decryption using RSA algorithm for p = 12, q = 31, e = 7, μ = 2. **(05 Marks)**
   c. Write short notes on:
      i) Digital signature standard
      ii) Direct and arbitrated digital signature. **(12 Marks)**

4 a. Discuss briefly the working KERBEROS authentication protocol. **(12 Marks)**
   b. Define the classes of message authentication functions. **(03 Marks)**
   c. Describe the requirements for a Hash functions. **(05 Marks)**

PART – B

5 a. With a neat diagram, explain hand shake protocol action and the operation of record protocol of SSL. **(12 Marks)**
   b. Explain in detail the following transactions supported by SET.
      i) Purchase request
      ii) Payment authorization **(08 Marks)**

6 a. Explain UNIX password scheme, with a diagram. **(06 Marks)**
   b. Explain the architecture of distributed intrusion detection with a neat diagram. **(08 Marks)**
   c. Give examples of metrics that are useful for profile based intrusion detection. **(06 Marks)**

7 a. Give the taxonomy of malicious programs. List the software threats and explain them. **(08 Marks)**
   b. With a diagram, explain digital immune systems. **(08 Marks)**
   c. Write short notes on behaviour blocking software. **(04 Marks)**

8 a. Explain with neat diagram the various types of firewall configuration. **(09 Marks)**
   b. Write short notes on: i) Reference monitor property
                            ii) Multilevel security requirements. **(06 Marks)**
   c. With a neat diagram, explain the working of a packet-filter router. **(05 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
Multimedia Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. List the different types of multimedia networks. Explain (i) Telephone Network (ii) Integrated Services Digital Network (ISDN) in detail with suitable figures. **(08 Marks)**
   b. Explain the working principle of circuit mode and packet mode of operation of multimedia networks. **(08 Marks)**
   c. List the different operational modes of a communication channel with relevant figures. **(04 Marks)**

2 a. Assuming the Bandwidth of a speech signal is from 50 Hz through to 10 kHz and that of a music signal is from 15 Hz through 20 kHz. Derive the bit rate that is generated by the digitization procedure in each case assuming the Nyquist sampling rate is used with 12 bits per sample for speech signal and 16 bits per sample for music signal. Derive the memory required to store a 20 minute passage of stereophonic music. **(06 Marks)**
   b. With the aid of a diagram, explain how an image produced by a scanner or digital camera is captured and stored within a computer memory. **(10 Marks)**
   c. Assuming the CD-DA standard is being used device: (i) The storage capacity of a CDROM to store a 60 minute multimedia title (ii) The time to transmit a 30 second portion of the title using a transmission channel of bit rate * 64 Kbps, * 1.5 Mbps **(04 Marks)**

3 a. Explain the meaning of following terms relating to compression:
      (i) Lossless and lossy compression
      (ii) Source and Entropy encoding. **(10 Marks)**
   b. A message comprising of a string of characters with probabilities e = 0.3, n = 0.3, t = 0.2, w = 0.1, • = 0.1 is to be encoded. The message to be sent is 'went'. Compute the arithmetic codeword. **(10 Marks)**

4 a. Explain how better sound quality can be obtained by using subband ADPCM, with the help of block diagrams of encoder and decoder. **(10 Marks)**
   b. Draw the block diagram of H.261 video encoder and explain the role of FIFO buffer and the associated high and low threshold values. **(10 Marks)**

PART – B

5 a. Explain in detail token ring network frame formats and field description. **(10 Marks)**
   b. Explain in detail, with a diagram LAN protocols and protocol frame work. **(10 Marks)**

6 a. Explain the datagram format of IPv6. Explain the role of each header fields. **(10 Marks)**
   b. Explain the operation of internet with a neat diagram of protocols associated with networking components. **(10 Marks)**

7 a. Explain the general structure of ATM switch architecture. **(10 Marks)**
   b. Explain the ATM adaptation layer 1 and 2 with neat diagrams. **(10 Marks)**

8 a. Explain TCP/IP protocol suite. **(10 Marks)**
   b. In relation to RTP packet format, explain briefly the meaning and use of the following fields: (i) CC and CSRC (ii) M and Payload type (iii) Sequence number. **(05 Marks)**
   c. With the aid of a diagram, explain briefly UDP datagram header fields. **(05 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
Real Time Operating Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Write any six key features that an RTOS should have.   **(06 Marks)**
    b.   Explain briefly the history of embedded systems and write the pseudo code for basic real time service.   **(08 Marks)**
    c.   Differentiate between pre-emptive and non-pre-emptive scheduling.   **(06 Marks)**

2   a.   Using service utility function differentiate between the following. Also give an example for each:
         (i)   Hard real time service and isochronous service.
         (ii)   Soft real time service and anytime service..   **(10 Marks)**
    b.   Write the state transition diagram and state transition table for a thread of execution including all possible states.   **(10 Marks)**

3   a.   Explain RM-LUB sufficient feasibility test by taking the example of two services. **(10 Marks)**
    b.   Describe the algorithms for determination of N and S feasibility.   **(10 Marks)**

4   a.   Explain the worst case execution time of a service.   **(10 Marks)**
    b.   Explain execution efficiency and pipelining concept.   **(10 Marks)**

PART – B

5   a.   Explain the dead lock and live lock.   **(10 Marks)**
    b.   What is priority inversion? How an unbounded priority inversion can be converted to a bounded one.   **(10 Marks)**

6   a.   Explain briefly the mixed hard and soft real time services.   **(10 Marks)**
    b.   Describe the 3 Firmware components and any 3 RTOS system software mechanisms.
                                                                                  (10 Marks)

7   a.   Explain the basic concepts of drill down tuning.   **(10 Marks)**
    b.   Explain method to find path length, efficiency and calling frequency using C code to compute Fibonacci sequence.   **(10 Marks)**

8   a.   With the help of a block diagram, explain low-end PIC micro MCU programmer. **(12 Marks)**
    b.   Write note on RTOS based digital clock and thermometer.   **(08 Marks)**

* * * * *

Eighth Semester B.E. Degree Examination, June/July 2018
GSM

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a.   Explain the objectives and services of a GSM PLMN.   (08 Marks)
      b.   Briefly explain the GSM Interfaces.   (06 Marks)
      c.   Bring out the importance of IMSI and IMEI identities of an MS.   (06 Marks)

2   a.   Explain the future techniques to reduce interference in GSM.   (10 Marks)
      b.   Explain any two methods that are used to reduce interference in GSM system.   (10 Marks)

3   a.   Explain the various bursts that are used in GSM, with a neat format.   (10 Marks)
      b.   Give a brief note : i) Data Encryption in GSM   ii) Mobile Identification.   (10 Marks)

4   a.   Explain the different attributes of a GSM speech codec.   (08 Marks)
      b.   With relevant figures, explain the working of GSM full rate vocoder.   (08 Marks)
      c.   Write a short note on ITU – T standards.   (04 Marks)

PART – B

5   a.   Explain with flow diagram for GSM call release.   (08 Marks)
      b.   Explain Intra MSC handover in GSM, with relevant flow diagram.   (08 Marks)
      c.   Briefly explain any one method of SMS, with relevant block diagram.   (04 Marks)

6   a.   Explain the wireless security requirements in GSM.   (08 Marks)
      b.   Explain the call flow for Token based registration.   (06 Marks)
      c.   List and explain the Security Algorithms used in GSM.   (06 Marks)

7   a.   Describe the factors to be satisfied while designing a wireless system.   (08 Marks)
      b.   Write a short note on Spectral Efficiency with an equation of a wireless system.   (06 Marks)
      c.   Explain the factors to be considered in selecting a modulation scheme.   (06 Marks)

8   a.   Write a brief note on SNMP.   (04 Marks)
      b.   Bring out the Management requirements for wireless networks.   (08 Marks)
      c.   What are the five TMN layers? Explain the three pertinent layers.   (08 Marks)

*****

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

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions.*

1   a. Explain briefly EPC architecuture.   (08 Marks)
    b. Explain multiantenna technique which supports LTE.   (08 Marks)

2   a. Explain in brief : i) Fading   ii) Sectoring.   (08 Marks)
    b. Explain equalizers in brief.   (08 Marks)

3   a. Explain the computational technique used in OFDM.   (08 Marks)
    b. Mention OFDMA system design consideration. Explain in brief resource allocation in cellular system.   (08 Marks)

4   a. Explain in brief: i) Array gain   ii) Diversity gain.   (08 Marks)
    b. Explain 2 × 2 SFBC approach in open-loop transmit diversity.   (08 Marks)

5   a. Explain the basic design principles of LTE.   (08 Marks)
    b. Explain the structure of rate 1/3 turbo encoder.   (08 Marks)

6   a. Explain DCI in channel encoding.   (08 Marks)
    b. Explain multicast channels in downlink transport channel processing. (08 Marks)

7   a. Explain in brief : i) Frequency hopping   ii) Multiantenna transmission.   (08 Marks)
    b. Explain non-synchronized random access procedure.   (08 Marks)

8   a. Explain CQI feedback in brief.   (08 Marks)
    b. Explain the cell search process in LTE.   (08 Marks)

9   a. Explain main services and functions of RLC sublayer.   (08 Marks)
    b. State the main functions of RRC protocol.   (08 Marks)

10 a. Explain mobility management over X_2 interface.   (08 Marks)
    b. Explain the basic approaches for uplink ICI mitigation.   (08 Marks)

* * * * *

USN | | | | | | | | | | **15EC82**

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

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Explain with a neat diagram an optical fiber communication system. **(06 Marks)**
    b. Derive an equation for numerical aperture for a step index fiber using Snell's law. **(07 Marks)**
    c. A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and cladding refractive index of 1.47. Determine:
      i)   Critical angle at the core – cladding interface
      ii) The numerical aperture for the fiber
      iii) The acceptance angle in air for the fiber. **(03 Marks)**

2 a. Discuss the advantages of optical fiber communication. **(05 Marks)**
    b. Explain photonic crystal fibers. **(07 Marks)**
    c. A graded index fiber has core with a parabolic refractive index profile which has a diameter of 50μm. The fiber has a numerical aperture of 0.2 estimate the total number of guided modes propagating in the fiber when it is operating at a wave length of 1μm. **(04 Marks)**

3 a. Explain intrinsic and extrinsic absorption losses. **(06 Marks)**
    b. Explain fiber bending losses with the help of neat diagrams. **(06 Marks)**
    c. When the mean optical power launched into an 8km length of fiber is 120μw, the mean optical power at the fiber output is 3μw. Determine :
      i)   The overall signal attenuation or loss in the decibels through the fiber assuming there are no connectors or splices.
      ii) The signal attenuation per kilometer for the fiber
      iii) The overall signal attenuation for a 10km optical link using the same fiber with splices at 1km intervals, each giving an attenuation of 1dB
      iv) The numerical input/output power ration in (iii). **(04 Marks)**

4 a. Derive an expression for r.m.s pulse broadening due to intermodal dispersion in a step index fiber. **(06 Marks)**
    b. Explain three types fiber splicing techniques with neat diagrams. **(06 Marks)**
    c. An optical fiber has a core refractive index of 1.5. Two lengths of the fiber with smooth and perpendicular (to the core axis) end faces are butted together. Assuming the fiber axis are perfectly aligned, calculate the optical loss in decibels at the joint (due to Fresnel reflection) when there is a small air gap between the fiber end faces. **(04 Marks)**

5 a. With neat sketch, explain GaAs homo-injection LASER Fabry – Perot cavity. **(06 Marks)**
    b. Derive an expression for quantum efficiency and LED power. **(06 Marks)**
    c. Discuss the operation of PIN photodetector with appropriate diagrams. **(04 Marks)**

6 a. With a neat schematic diagram, explain the working of an optical receiver. **(06 Marks)**

   b. Explain the different types of front end amplifiers in an optical receiver. **(06 Marks)**

   c. A double – heterojunction In GaAsP LED emitting at a peak wavelength of 1310nm has radiative and nonradiative recombination times of 30 and 100ns, respectively. The drive current is 40mA. Calculate : i) bwk recombination lifetime ii) internal quantum efficiency iii) internal power. **(04 Marks)**

7 a. With the help of neat diagram, explain the operation of WDM (Wavelength Division Multiplexing). **(08 Marks)**

   b. Derive an equation for path difference in a 2 × 2 Mach – Zehnder interferometer. **(08 Marks)**

8 a. Explain the operation of polarization independent isolator. **(06 Marks)**

   b. Explain the three possible configurations of an EDFA (Erbium doped Fiber amplifiers). **(10 Marks)**

9 a. Briefly discuss the evolution of optical networks indicate the significant features of the optical network generations. **(06 Marks)**

   b. Describe the concept of OXC (Optical Cross Connect) and a ROADM (Reconfigurable optical add/drop multiplexer) outline how they are utilized in the development of large scale wavelength division multiplexed networks. **(06 Marks)**

   c. Define what is ATM(Asynchronous Transmission Mode) and its application in optical networks. **(04 Marks)**

10 a. Describe the purpose and the layered structure of Open System Interconnection (OSI) reference model. **(08 Marks)**

   b. Outline the main features of the optical transport network and describe its hierarchy as specified by ITU-T. **(08 Marks)**

* * * * *

USN | | | | | | | | | | **17EC835**

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)**

* * * * *

USN | | | | | | | | | | 15EC835

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

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Describe the steps of SSL record protocol provides two services for SSL connections.
                                                                    (08 Marks)
   b. Describe the different step involved in exchange of message from client and server in handshake protocol.   (08 Marks)

2 a. Discuss the pseudorandom function in TLS.   (08 Marks)
   b. Discuss sequence of step involved during message exchange in user authentication protocols of SSH.   (08 Marks)

3 a. Discuss the confidentiality and authentication in PGP cryptographic function.   (10 Marks)
   b. Define the five header fields in MIME.   (06 Marks)

4 a. Illustrate the key component of the internet mail architecture with neat diagram.   (10 Marks)
   b. Discuss the five header fields in MIME.   (06 Marks)

5 a. Describe the various IP security document categorized roadmap.   (06 Marks)
   b. Describe the IP security policy applied to each IP packet that transits from a source to a destination.   (10 Marks)

6 a. With neat diagram, describe various fields in ESP packet format.   (08 Marks)
   b. With neat diagram, describe various fields in IKE header format.   (08 Marks)

7 a. What are the significance of policy driven security certifications do net address the threat.
                                                                    (08 Marks)
   b. Describe the list of specialized skills that should be available on demand in IT security.
                                                                    (08 Marks)

8 a. Describe the different type of full cyber anti-pattern template.   (12 Marks)
   b. What are the components of a micro anti-pattern templates.   (04 Marks)

9 a. How does the zachman framework help with cyber security?   (06 Marks)
   b. Describe the architectural problem solving patterns.   (10 Marks)

10 a. Describe the hardware setup sequence for a desktop pedestal.   (08 Marks)
   b. Describe the implementation with a combination of location protections, services and enterprise services that manage local configurations and services.   (08 Marks)

* * * * *

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)

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐   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)**

* * * * *

USN | | | | | | | | | | 17EC834

Eighth Semester B.E. Degree Examination, July/August 2021
Machine Learning

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a. Mention five applications of machine learning.   (05 Marks)
     b. Explain List-Then-Eliminate algorithm.   (05 Marks)
     c. Analyze the given instances in Table Q.1(c) and find the version space using candidate-elimination algorithm.   (10 Marks)

Instances	Citations	Size	In library	Price	Editions	Buy
1	Some	Small	No	Affordable	One	No
2	Many	Big	No	Expensive	Many	Yes
3	Many	Medium	No	Expensive	Few	Yes
4	Many	Small	No	Affordable	Many	Yes

Table Q.1(c)

2   a. Explain different perspectives and issues in machine learning.   (05 Marks)
     b. Enumerate the steps in designing a learning system.   (05 Marks)
     c. Write the Find-S algorithm. Analyze the given instances in Table Q.2(c) and find maximally specific hypothesis using Find-S.   (10 Marks)

Instances	Citations	Size	In Library	Price	Editions	Buy
1	Some	Small	No	Affordable	Many	No
2	Many	Big	No	Expensive	One	Yes
3	Some	Big	Always	Expensive	Few	No
4	Many	Medium	No	Expensive	Many	Yes
5	Many	Small	No	Affordable	Many	Yes

Table Q.2(c)

3   a. Given $W_1 = W_2 = 0.5$, show that how a single-layer perceptron can solve the following linearly separable problem.
         i)   A AND B with bias = -0.75
         ii) A OR B with bias = -0.25   (08 Marks)
     b. Construct decision tree using ID3 algorithm considering the training examples given in Table Q.3(b).   (12 Marks)

Instance	a1	a2	a3	Classification
1	True	Hot	High	No
2	True	Hot	High	No
3	False	Hot	High	Yes
4	False	Cool	Normal	Yes
5	False	Cool	Normal	Yes
6	True	Cool	High	No
7	True	Hot	High	No
8	True	Hot	Normal	Yes
9	False	Cool	Normal	Yes
10	False	Cool	High	Yes

Table Q.3(b)

4 a. List the appropriate problems for neural network learning. **(05 Marks)**
   b. Define perceptron and discuss its training rule. **(05 Marks)**
   c. Define entropy and information gain. For the transactions shown in the Table Q.4(c) compute the following:
   i) Entropy of the collection of transaction records of the table with respect to classification.
   ii) What are the information gain of a1 and a2 relative to the transactions of the table?

Instance	1	2	3	4	5	6	7	8	9
a1	T	T	T	F	F	F	F	T	F
a2	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-

Table Q.4(c)

(10 Marks)

5 a. Explain Baye's theorem, MAP hypothesis and ML hypothesis. **(09 Marks)**
   b. Classify the dataset: <sunny, cool, high, strong> using Naïve Bayes classifier for the dataset shown in Table Q.5(b). Also find conditional probabilities of each attribute. **(11 Marks)**

Day	Outlook	Temperature	Humidity	Wind	Play Tennis
1	Sunny	Hot	High	Weak	No
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	Yes
5	Rain	Cool	Normal	Weak	Yes
6	Rain	Cool	Normal	Strong	No
7	Overcast	Cool	Normal	Strong	Yes
8	Sunny	Mild	High	Weak	No
9	Sunny	Cool	Normal	Weak	Yes
10	Rain	Mild	Normal	Weak	Yes
11	Sunny	Mild	Normal	Strong	Yes
12	Overcast	Mild	High	Strong	Yes
13	Overcast	Hot	Normal	Weak	Yes
14	Rain	Mild	High	Strong	No

Table Q.5(b)

6 a. Prove that minimizing the squared error between the output hypothesis predictions and the training data will output a maximum likelihood hypothesis. **(07 Marks)**
   b. Consider a football game between two rival teams, say team A and team B. Suppose team A wins 65% of the time and team B coins the remaining matches. Among the games won by team A, only 35% of them comes from playing at team B's foot ball field. On the otherhand, 75% of the victories for team B are obtained while playing at home. If team B is to host the next match between the two teams, who will emerge as the winner? **(07 Marks)**
   c. Given that 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. Also, 0.008 of the entire population have this cancer. Suppose a new patient is observed for whom the lab test returns a negative (-) result. Should we diagnose the patient as having cancer or not? **(06 Marks)**

7 a. Explain K-nearest neighbor algorithm with example plots. List out its advantages and disadvantages. **(10 Marks)**
   b. Explain locally-weighted linear regression with example plots. List out its advantages and disadvantages. **(10 Marks)**

8   a. Explain sequential covering algorithm for learning disjunctive set of rules with example.
                                                                            (06 Marks)
    b. Define literal, ground literal, negative literal and positive literal.   (04 Marks)
    c. Explain the basic FOIL algorithm with example and describe how to handle noisy data.
                                                                            (10 Marks)

9   a. Explain an analytical learning problem with example.   (10 Marks)
    b. Discuss the explanation based learning algorithm P_{ROLOG} = EBG.   (10 Marks)

10 a. Discuss inductive learning versus analytical learning.   (08 Marks)
    b. Explain the FOCL algorithm with example.   (12 Marks)

* * * * *

USN | | | | | | | | | | **17EC835**

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)**

* * * * *