

CBCS SCHEME

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15EC81

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020 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. List the advantages of OFDM leading to its selection for LTE and explain. (08 Marks)
b. Discuss the delay spread and coherence bandwidth with relevant expressions. (08 Marks)

OR

- 2 a. Write the block diagram of end to end architecture of EPC supporting current and legacy Radio access networks and discuss the elements of EPC. (08 Marks)
b. Consider a user in downlink of a cellular system where the desired base station is at a distance 0.5 KM and the interfering base stations (i) B_1 and B_2 located at a distance of 1.0 KM, (ii) B_3 , B_4 and B_5 located at a distance of 2 KM (iii) B_6 to B_{11} treated at a distance of 2.66 KM. Each of the stations transmitted power at the same level. Find the SIR when the path loss exponent $\alpha = 3$ and also when $\alpha = 5$. (08 Marks)

Module-2

- 3 a. With the help of neat diagrams explain how the timing and frequency synchronization is performed by the receiver to demodulate an OFDM signal. (08 Marks)
b. Write the block diagrams of receive diversity and explain the principle of operation. (08 Marks)

OR

- 4 a. Write the block diagram of OFDMA down link transmitter and explain the principle of operation. (08 Marks)
b. Explain the spatial multiplexing MIMO system and the key points of single user MIMO system model. (08 Marks)

Module-3

- 5 a. Discuss the radio interface protocol stack of LTE. (08 Marks)
b. Write the structure of downlink resource grid and explain the types of resource allocation. (08 Marks)

OR

- 6 a. Write the Frame structure Type 2 and explain the various fields applicable to TDD mode. (08 Marks)
b. Discuss the Broadcast channels and multicast channels. (08 Marks)

Module-4

- 7 a. With the help of a neat block diagram, explain the SC-FDMA base band signal generation. (08 Marks)
b. Discuss the random access procedures in detail. (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.

OR

- 8 a. Explain the seven different transmission modes, defined for data transmission on the PDSCH channel. (07 Marks)
b. Discuss the scheduling and resource allocation in LTE. (09 Marks)

Module-5

- 9 a. Explain the main services and functions of the PDCP. (08 Marks)
b. Describe the various phases of S1 mobility with a neat diagram. (08 Marks)

OR

- 10 a. Explain the data transfer modes and the main services and functions of the RLC sublayer. (08 Marks)
b. Discuss the intercell interference coordination in downlink and uplink. (08 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Switching Systems

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. With a neat diagram, explain the national telecommunications network. (08 Marks)
 b. With a neat diagram, explain the principle of operation of a four wire circuit. (08 Marks)
 c. What is bit interleaving and word interleaving? Explain with examples where are they used. (04 Marks)
- 2 a. Bring out the differences between message switching and circuit switching. (06 Marks)
 b. Explain the operation of distribution frames with a neat diagram. What are the significance of distribution frames? (10 Marks)
 c. Describe the different facilities provided by electronic switching. (04 Marks)
- 3 a. Derive Erlang's lost call formula and explain the meaning of pure chance traffic and statistical equilibrium. (10 Marks)
 b. A group of 20 trunks provide a GOS of 0.01 when offered 12E of traffic. How much is the GOS improved if one extra trunk is added to the group? (06 Marks)
 c. A group of 20 trunks carry a traffic of 10E. If the average duration of a call is 3 minutes, calculate the number of calls put through by a single server and the group as a whole in one hour period. (04 Marks)
- 4 a. Briefly explain the following terms as applied to gradings:
 i) Graded groups
 ii) Availability
 iii) Progressive grading
 iv) Skipped grading
 v) Homogeneous grading. (10 Marks)
 b. A 3 stage fully interconnected switching network is to connect 600 incoming trunks to 100 outgoing trunks. It is to use switches assembled from blocks of size 5×5 . Design a suitable network and determine the number of switch blocks required. (10 Marks)

PART – B

- 5 a. With the help of neat diagrams, explain space switch and time switch. (12 Marks)
 b. A T-S-T network has 20 incoming and 20 outgoing PCM highways. Each connecting 30 channels. The required GOS is 0.01. Find the traffic capacity of the network if
 i) Connection is required to a particular free channel on a selected outgoing highway.
 ii) Connection is required to a particular outgoing highway but any free channel on it may be used. (08 Marks)

- 6 a. Briefly explain the software architecture for the three levels of control of a Digital Switching System. (10 Marks)
b. Explain the call forwarding feature with a neat flow diagram. (10 Marks)
- 7 a. Explain the methodology for reporting and correcting the field problems with a neat diagram. (06 Marks)
b. Explain the various causes of digital switch outages. (06 Marks)
c. Explain the strategy used for improving software quality. (08 Marks)
- 8 a. With neat diagrams, explain line to trunk intra IC OGT call and trunk to line inter IC OGT call. (12 Marks)
b. Explain some common characteristics of Digital Switching Systems. (08 Marks)

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10EC832

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Network Security

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Distinguish between passive and active security attacks. Explain various types of passive and active attacks in brief. (10 Marks)
- b. Draw the model for network security. Explain its function along with the basic tasks in designing a security service. (10 Marks)
- 2 a. Encrypt the plain text "HELLO" using play fair Cipher technique. Given key = EXAM. (06 Marks)
- b. With an illustrative example, explain one time pad. (06 Marks)
- c. Encrypt and decrypt the message 'HI' using Hill Cipher. Given that, $K = \begin{pmatrix} 3 & 7 \\ 15 & 12 \end{pmatrix}$ and $K^{-1} = \begin{pmatrix} 10 & 5 \\ 7 & 9 \end{pmatrix}$. (08 Marks)
- 3 a. With neat diagram, explain single round of DES encryption algorithm. (08 Marks)
- b. Explain the concept of public key cryptography with neat sketch. (06 Marks)
- c. Describe the RSA algorithm with an example. (06 Marks)
- 4 a. With an illustrative example, explain Diffie-Hellman key exchange algorithm. (10 Marks)
- b. What is a digital signature? What are its requirements? Explain direct digital signature and arbitrated digital signature. (10 Marks)

PART – B

- 5 a. Describe Secure Socket Layer (SSL) protocol stack with a neat sketch and define the different parameters used in session and connection states. (10 Marks)
- b. Describe the sequence of events that are needed for a transaction in SET. (10 Marks)
- 6 a. Describe briefly three classes of intruder. (06 Marks)
- b. What is intrusion detection? Explain the architecture of distributed intrusion detection in detail. (08 Marks)
- c. Briefly describe password selection strategies. (06 Marks)
- 7 a. Give the taxonomy of malicious programs. What are the various software threats? Explain. (10 Marks)
- b. What is DDOS? Describe the 3 lines of defence against DDOS attacks. (10 Marks)
- 8 a. With neat diagram, explain digital immune system. (10 Marks)
- b. What is a firewall? Describe various types of firewall configurations. (10 Marks)

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10EC843

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020

GSM

Time: 3 hrs.

Max. Marks:100

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

PART - A

- 1
 - a. Write a note on : i) NSS (Network & Switching Subsystem) ii) OMSS (Operation & Maintenance Subsystem). (08 Marks)
 - b. Explain GSM interfaces. (08 Marks)
 - c. List objectives of GSM PLMN. (04 Marks)
- 2
 - a. With three different frequencies, explain SFH in GSM. (08 Marks)
 - b. List and explain channel borrowing techniques to reduce interference in GSM. (08 Marks)
 - c. Calculate required minimum received power for a GSM system having receiver noise bandwidth of 200 kHz, noise figure of 7dB, S/I ratio of 12dB and $kT = -174$ dBm/Hz. (04 Marks)
- 3
 - a. Write a note on GSM logical channels. (08 Marks)
 - b. Briefly explain : i) Normal burst ii) Access burst. (08 Marks)
 - c. Explain Mobile Identification process in GSM. (04 Marks)
- 4
 - a. With A – Law and μ – Law compounded PCM, explain Time Domain Waveform Coding. (08 Marks)
 - b. Write a note on : i) GSM Bearer Services ii) GSM Teleservices. (08 Marks)
 - c. With the help of block diagram , explain Full Rate Vocoder. (04 Marks)

PART - B

- 5
 - a. Explain Mobile terminated call scenarios. (08 Marks)
 - b. With the help of Architecture and Protocol Stack, explain SMS. (08 Marks)
 - c. Briefly explain user to user signaling data services. (04 Marks)
- 6
 - a. With the help of high level diagram of a PCS system, explain privacy of communications. (08 Marks)
 - b. Write a note on Storage Capability of SIM Card. (08 Marks)
 - c. Write about Token based challenge. (04 Marks)
- 7
 - a. Explain Spectral Efficiency of a Wireless System. (08 Marks)
 - b. Design a TDMA frame for a cellular system to support variable bit rates from 8 kbps to 128 kbps. A user can be assigned not more than 2 carriers. Assume GMSK modulation, a coding rate of $R_c = \text{one} - \text{half}$, frame efficiency of 75% and the symbol rate of the SACCH – $a_1 = 0.1R_s$. The cell radius is limited to 5km and maximum processing delay to 90ms. The velocity of light is $C = 3 \times 10^8$ mps. (08 Marks)
 - c. Briefly explain Mobility models. (04 Marks)
- 8
 - a. Explain Management requirements for Wireless Networks. (08 Marks)
 - b. With Architecture, explain NM interfaces and functionality. (08 Marks)
 - c. Write a note on TMN Nodes. (04 Marks)

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