"GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IAŞI
FACULTY OF ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

BACHELOR DIPLOMA EXAM JULY 2026

Fundamental and Specialized Knowledge Assessment Test

Discipline Computer Networks and Operating Systems

Study Programme: **Telecommunication Technologies and Systems**

ANSWER KEY

The answer is marked by circling one of the letters a, b, c, or d of the answer options.

1. Which of the following protocols is a transport protocol?
   (a.) TCP 1.5 p
   b. STP
   c. SMTP
   d. NTP
2. Which of the following protocols works on OSI Layer 7?
   a. UDP
   b. PPP
   c. ICMP
   (d.) DHCP 1.5 p
3. What OSI Layer is AES algorithm used for data encryption?
   a. application
   b. session
   (c.) presentation 1.5 p
   d. network
4. What format does the MAC address use?
   a. 4 decimal-dotted octets
   (b.) 6 hexadecimal octets 1.5 p
   c. 16 hexadecimal octets
   d. 16 bits
5. What network cable is the RJ-45 connector used for?
   a. optical SMF
   b. optical MMF
   (c.) UTP 1.5 p
   d. coaxial
6. How many host addresses are available in an IPv4 subnet using the mask /26?
   (a.) 62 1.5 p
   b. 30
   c. 14
   d. 6 + 1 office point

"GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IAȘI
FACULTY OF ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

BACHELOR DIPLOMA EXAM JULY 2026

Fundamental and Specialized Knowledge Assessment Test

Discipline Mobile Communications

Graduate name:.....

Study Programme: **Telecommunication Technologies and Systems**

The answer is marked by circling one of the letters a, b, c, or d of the answer options.

1	1p	The length of the Transmission Time Interval (TTI) in LTE is equal with:	a. 10 ms b. 5 ms c. 0.5 ms d. 1 ms
2	1p	The subcarrier spacing in an OFDM transmission is directly related to:	a. Data symbol period b. Delay spread c. Doppler spread (shift) d. Cluster size
3	1p	One of the new functionalities introduced by LTE-A is:	a. Fast dormancy b. Carrier aggregation c. Extended Cyclic Prefix (CP) d. Fast hybrid retransmission (H-ARQ)
4	1p	A mobile cellular network has 56 cells organized in clusters of size 7 and it has a total of 98 channels. The maximum number of comunications simultaneously sustained by the network is:	a. 98 b. 392 c. 686 d. 784
5	1p	The SC-FDMA multiple access technique on the LTE uplink was selected in order to:	a. Minimize PAPR b. Maximize spectral efficiency c. Maximize network capacity d. Minimize interference
6	1p	A mobile cellular network has 21 cells organized in 3 clusters and a total number of 84 channels. How many channels every cell receives ?	a. 4 b. 12 c. 7 d. 28
7	1p	The path loss exponent is related to its dependence on:	a. Distance b. Frequency c. Time d. Received power
8	1p	The RF carriers in UMTS standard have a transmission bandwidth equal with:	a. 200 kHz b. 5 MHz c. 1 MHz d. 10 MHz
9	1p	The radio access network (UTRAN) of the UMTS standard uses time frames containing a number of slots equal with:	a. 8 b. 10 c. 15 d. 20

"GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IAŞI
FACULTY OF ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

BACHELOR DIPLOMA EXAM JULY 2026

Fundamental and Specialized Knowledge Assessment Test

Discipline Radiocommunications

Study Programme: **Telecommunication Technologies and Systems**

1) What is the primary effect of increasing the noise bandwidth of a phase-locked loop (PLL)?
a. The loop tracks phase variations more slowly and reduces the output noise.
b. The loop tracks phase variations more rapidly but becomes more sensitive to noise.
c. The frequency of the voltage-controlled oscillator no longer depends on the phase detector.
d. The PLL can no longer achieve phase lock.

2) Which of the following statements correctly describes the operating principle of a Costas loop used for carrier recovery in a BPSK signal?
a. It directly compares the phase of the received signal with that of the local oscillator, without using the in-phase and quadrature components.
b. It requires prior knowledge of the transmitted data sequence to achieve carrier synchronization.
c. It uses the in-phase (I) and quadrature (Q) components to generate an error signal that is essentially independent of the transmitted data and primarily dependent on the carrier phase error.
d. It can only be used for QAM signals and cannot be applied to BPSK or QPSK signals.

3) A receiver operates with low-side local oscillator injection. If the receiver is tuned to an RF frequency of f_{RF} = 145 MHz and the intermediate frequency is f_{IF} = 10.7 MHz, what is the image frequency?
a. 155.7 MHz
b. 134.3 MHz
c. 166.4 MHz
d. 123.6 MHz

4) What type of circuit uses a voltage-controlled oscillator (VCO) a phase comparator, and a low-pas filter?
a. A frequency synthesizer
b. An asynchronous detector
c. A phase-locked loop
d. A voltage comparator

5) When the message signal amplitude is zero, the FM carrier signal is at what frequency?
a. Center frequency
b. Maximum frequency
c. Minimum frequency
d. Deviation frequency

6) The frequency of the RF signal applied to the mixer of a superheterodyne SSB receiver operating with high-side local oscillator injection is 1500 kHz. If the intermediate frequency is 455 kHz, what is the frequency of the local oscillator?

a. 910 kHz
b. 1955 kHz
c. 1045 kHz
d. 2410 kHz

7) The input signal power of an RF power amplifier with a power gain of 1000 is 5 W. If 90% of the amplifier output power is transferred to the antenna, what is the power radiated by the antenna?

a. 5000 W
b. 500 W
c. 4500 W
d. 5556 W

8) If the antenna matching network of an RF power amplifier presents an impedance of 180 Ω, while the antenna impedance is 50 Ω, what is the output impedance of the RF power amplifier?

a. 230 Ω
b. 90 Ω
c. 50 Ω
d. 180 Ω

9) What is the function of a balanced modulator?

a. Modulation
b. Phase detection
c. Mixing
d. All of these