

BACHELOR DIPLOMA EXAM SEPTEMBER 2026

Fundamental and Specialized Knowledge Assessment Test

Discipline Computer Networks and Operating Systems

Graduate name:..... BAREM

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. Which of the following protocols works on OSI Layer 4?
 - a. PPP
 - ☒ b. UDP
 - c. ICMP
 - d. DHCP
2. Which of the following protocols is an e-mail protocol?
 - a. TCP
 - b. STP
 - ☒ c. SMTP
 - d. NTP
3. What OSI Layer does a router work on?
 - ☒ a. network
 - b. session
 - c. presentation
 - d. application
4. What format does an IPv4 address use?
 - a. 16 bits
 - b. 6 hexadecimal octets
 - c. 16 hexadecimal octets
 - ☒ d. 4 decimal-dotted octets
5. What network cable is not recommended to use if strong electromagnetic interferences occurs in the environment?
 - a. coaxial
 - ☒ b. UTP
 - c. optical SMF
 - d. optical MMF
6. How many host addresses are available in an IPv4 subnet using the mask /27?
 - a. 6
 - b. 14
 - ☒ c. 30
 - d. 62

Conf. L. Scripcariu

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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. 1 ms b. 5 ms c. 0.5 ms d. 10 ms
2	1p	The subcarrier spacing in an OFDM transmission is directly related to:	a. Delay spread b. Doppler spread (shift) c. Data symbol period d. Cluster size
3	1p	One of the new functionalities introduced by LTE-A is:	a. Fast dormancy b. Shared channels c. Incremental redundancy d. Coordinated Multipoint transmission and reception (CoMP)
4	1p	A mobile cellular network has 48 cells organized in clusters of size 4 and it has a total of 56 channels. The maximum number of communications simultaneously sustained by the network is:	a. 576 b. 672 c. 224 d. 192
5	1p	The SC-FDMA multiple access technique on the LTE uplink was selected in order to:	a. Minimize reuse coefficient b. Maximize SNR c. Maximize SINR d. Minimize PAPR
6	1p	A mobile cellular network has 72 cells organized in 6 clusters and a total number of 108 channels. How many channels every cell receives ?	a. 9 b. 12 c. 6 d. 18
7	1p	The path loss exponent is related to its dependence on:	a. Time b. Frequency c. Distance d. Received power
8	1p	The RF carriers in UMTS standard have a transmission bandwidth equal with:	a. 200 kHz b. 1 MHz c. 5 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. 15 c. 10 d. 20

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BAREM notare - Discipline Radiocommunications

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

1) If a 3 kHz message signal modulates an 800 kHz carrier signal, what frequency are contained in the AM radio signal?

- a. 3 kHz and 800 kHz
- b. 800 kHz and 803 kHz
- c. 797 kHz and 803 kHz
- d. 797 kHz, 800 kHz, and 803 kHz** (1p)

2) For a frequency-modulated (FM) signal with a sinusoidal modulating signal of frequency f_m and a maximum frequency deviation Δf , which of the following expressions approximates the occupied bandwidth according to Carson's rule?

- a. $B \approx 2(\Delta f + f_m)$** (1p)
- b. $B \approx 2f_m$
- c. $B \approx 2\Delta f$
- d. $B \approx \Delta f / f_m$

3) The phase shifter section of the quadrature detector shifts what FM signal frequency by 90°?

- a. upper sideband frequencies
- b. center frequency:** (1p)
- c. lower sideband frequencies
- d. All of these.

4) Which of the following factors directly determines the free-space attenuation of a radio wave?

- a. The type of modulation used.
- b. The bit rate of the transmitted signal.
- c. The signal frequency and the distance between the transmitter and receiver.** (1p)
- d. The type of channel coding used.

5) In the case of QPSK (Quadrature Phase Shift Keying) modulation, which of the following statements is correct?

- a. Each QPSK symbol transmits one bit of information.
- b. QPSK uses eight distinct carrier phase values.
- c. The QPSK constellation consists of four symbols, each representing two bits.** (1p)
- d. QPSK transmits three bits of information per symbol.

6) The gain of the RF stage is 58 dB. If the RF stage output power level is -20 dBm, what is the input power?

- a. 38 dBm
- b. -78 dBm** (1p)
- c. -40 dBm
- d. 78 dBm

7) In a receiver, what component down-converts the RF signal to an IF signal?

- a. product detector
- b. RF filter
- c. envelope detector
- d. mixer** (1p)

8) If a PLL is functioning as an FM detector, what occurs when the FM bandwidth becomes greater than the lock range?

- a. The recovered message signal becomes slightly distorted.
- b. There is no effect on the operation of the PLL discriminator.
- c. The free-running frequency of the VCO changes.
- d. The message signal is not recovered from the FM signal.** (1p)

9) In a PLL frequency synthesizer with a programmable divider in the feedback loop, the reference frequency applied to the phase detector is 1MHz, and the division factor is $N = 2450$. Assuming that the PLL is locked and an integer divider (Integer-N) is used, what is the VCO output frequency?

- a. 2.449 GHz;
- b. 2.451 GHz;
- c. 2.450 GHz;** (1p)
- d. 245 MHz.

TOTAL = 9p + 1p (of.) = 10p