1 Errata

• New question has been added to section Quiz A9- subsection C8 as Question 15. The

new question is quoted below as well.

Which statement(s) below is/are true about optimal antenna separation in NxN symmetric

MIMO design?

(a) The optimal antenna separation is given by d1d2 = Dλ

N , where d1 and d2 are

antenna separations, D is the hop length, λ is the wavelength and N is the

number of antennas.

(b) The optimal antenna separation is directly proportional with both hop length and

number of antennas.

(c) The optimal antenna separation is inversely proportional with wavelength.

(d) None of the above.

2 Quiz A1 : Article 02a & 02b

1. A review of prior relevent literature is an essential feature of any academic project. Which

of the following is/are true about writing the literature review?

(a) A literature review is concept-centric.

(b) A literature review is author-centric.

(c) Writing a review not only requires an examination of the past research, but also means

making a chart for the future research.

(d) Past tense should always be used when writing about prior research.

2. Which of the below is/are correct about sections in an academic paper?

(a) The abstract is placed in the beginning of a paper and it should be written at the

very beginning of the research process.

(b) The first paragraph of the introduction should concisely state on the objective of the

work, and on why this objective is important.

(c) A summary of the conclusions should be added to the introduction section.

(d) It is usually not a good practice to combine results and discussion sections.

3. Which of the following is/are recommended by Jane Webster and Richard T. Watson, to

determine the source material for the literature review?

(a) It makes sense to start with leading journals as they are more likely to have major

contributions.

(b) In order to determine the prior articles, you should consider to go backward by reviewing

the citations of the identified articles.

(c) A complete review is better when the resource materials are confined to one research

methodology, one set of journals, or one geographic region.

(d) All of the above.

4. Which of the following statement is(are) correct about the tense in an academic paper?

(a) When describing experimental results, use the present tense.

(b) When attributing a statement or idea to a person, use the past tense.

(c) When discussing concepts, use the present tense.

(d) All of the above.

Page 5

5. What is the primary purpose of an outline?

(a) To act as a detailed draft of the paper with full text.

(b) To serve as a written plan for organizing a paper, including the data on which it rests.

(c) To provide a list of references to be cited in the paper.

(d) None of the above.

6. What is the primary objective of research, and how can understanding the purpose and

form of a paper help you in organizing and conducting your research?

(a) The primary objective of research is to collect data, and understanding the purpose

and form of a paper can help in organizing the collected data.

(b) The primary objective of research is to formulate and test hypotheses, draw conclusions

from these tests, and teach these conclusions to others. Understanding the

purpose and form of a paper can be immensely useful in organizing and conducting

research.

(c) The primary objective of research is to publish as many papers as possible, and

understanding the purpose and form of a paper can help in increasing the number of

publications.

(d) The primary objective of research is to collaborate with other researchers, and understanding

the purpose and form of a paper can help in building a strong research

network.

7. Which of the following statement is(are) correct?

(a) An outline should contain significant amount of text to be readable.

(b) The outline should be organized around text.

(c) One should start to construct an outline after finishing a project.

(d) None of the above.

8. What is/are the correct fact(s) about writing an outline?

(a) It is better to wait until the data collection is completed to start writing the outline.

(b) The outline is a written plan which organizes the paper.

(c) Classical approach in constructing an outline is to write down all important ideas

that occur to you concerning the paper.

(d) Exchanging the outline and proposal with the supervisor, as early as possible will

help to make the writing more efficient.

Page 6

9. What is the recommended tone and tense when writing a literature review?

(a) Be constructive and respectful towards previous work, and use the present tense for

discussing concepts.

(b) Be overly critical of previous work, and use the past tense for discussing concepts.

(c) Be constructive and respectful towards previous work, but use the past tense for

discussing concepts.

(d) Be overly critical of previous work and use the present tense for discussing concepts.

10. Which of the following is/are true about identifying the source material for a review

article?

(a) It is better to start with the leading journals as they are likely to make major contributions.

(b) Web of Science can be used to identify the articles that are citing a set of previously

selected key articles.

(c) It is important to examine selected conference proceedings, especially the ones with

a good reputation for quality.

(d) Examining conference proceedings wastes time and thus is not needed.

3 Quiz A2 : Lecture 02

1. Which of the following best indicate(s) appropriate use(s) of generative artificial intelligence

(GAI) in academic writing?

(a) Verifying complex mathematical concepts.

(b) Clarifying complex theoretical concepts.

(c) Aiding with initial comprehension.

(d) Aiding with references for literature review.

2. Which question(s) is/are relevant while reading for a peer review?

(a) Does the paper provide significant contribution?

(b) Are all the technical details correct and sensible?

(c) Are there any serious ambiguities or inconsistencies?

(d) Do the methods used answer the research question?

3. Which of the following is/are NOT part of the writing process?

(a) Planning your writing.

(b) Copying intellectual property.

(c) Drafting.

(d) Revision.

Page 7

4. Which of the following is/are purpose(s) of the introduction section?

(a) Provide information about context.

(b) Indicate motivation for the paper.

(c) Define focus.

(d) Explain document structure.

5. Which level of prompting involves asking a generative artificial intelligence (GAI) tool to

ask you questions about your text?

(a) Level 1: Immediate correction.

(b) Level 3: Critical engagement.

(c) Level 4: Interactive learning.

(d) Level 2: Educational edit.

6. What are important factors to consider before you start writing a scientific article?

(a) What research question you are investigating.

(b) What audience you are writing for.

(c) What genre the text is.

(d) The title of the text.

7. How can revision process help with report writing?

(a) For terminology check.

(b) For argument support.

(c) To identify whether the information presented is accurate and precise.

(d) None of the above.

8. What is/are the purpose(s) of referencing in academic writing?

(a) To establish the genre of the text.

(b) To point to further reading options.

(c) To give credit to the original source of the information/idea.

(d) To indicate the motivation of the paper.

9. Which of the following is/are feature(s) that an abstract should contain?

(a) It should persuade the reader.

(b) It has to be written necessarily at the end of the writing process.

(c) It should disseminate the information of your work done.

(d) It should include personal opinions.

Page 8

10. Which of the following option(s) for assisted reading through generative artificial intelligence

(GAI) is/are the correct way(s) to use it?

(a) After reading a lengthy research paper, solely rely on GAI-generated summaries to

obtain a quick overview of the main findings and conclusions.

(b) When reading a complex scientific article, use GAI to assist in explaining intricate

theories or technical jargon, making the content more understandable for the reader.

(c) Use GAI-generated summaries to swiftly grasp the main findings and recommendations,

and then conduct a comprehensive assessment through the relevant literature.

(d) Use GAI to summarize and organize unpublished works, incorporating them into their

own report.

4 Quiz A3 : C2 – “Basic Principles of Wireless Networks”

4.1 C2 – “Basic Principles of Wireless Networks”

1. Which of the following statement(s) is/are true about channel coding?

(a) Coding increases the data rates and decreases the bit error rates.

(b) Coding increases both the data rates and the bit error rates.

(c) Coding decreases both the data rates and the bit error rates.

(d) Interleaving can help with burst errors.

2. Which of the following option(s) is/are correct regarding fading and its effects?

(a) Flat Fading (Has Doppler effect), Frequency Selective (No Doppler effect), Slow fading

(has ISI), and Fast Fading (No ISI).

(b) Flat Fading (Has ISI), Frequency Selective (No ISI), Slow fading (Has Doppler effect),

and Fast Fading (No Doppler effect).

(c) Flat Fading (No Doppler effect), Frequency Selective (Has Doppler effect), Slow fading

(No ISI), and Fast Fading (has ISI).

(d) Flat Fading (No ISI), Frequency Selective (has ISI), Slow fading (No Doppler effect),

and Fast Fading (Has Doppler effect).

3. Which of the below condition(s) characterize(s) flat fading?

(a) Signal bandwidth is lesser than coherence bandwidth.

(b) Delay spread is greater than symbol period (Ts).

(c) The range of frequencies in the spectrum is equally faded.

(d) Coherence time is small.

Page 9

4. Which of the following statement(s) is/are delay spread counter measure(s)?

(a) Signal processing at the receiver.

(b) Signal processing at the transmitter.

(c) Change how antennas inject the radio waves into the environment.

(d) Encoding information in a more optimal manner.

5. What technique(s) can be used to ”spread” the burst errors over many code words?

(a) Interpolation.

(b) Diversity.

(c) Delay spread.

(d) Inter-leaving.

6. Which of the following is/are NOT issue(s) with Multi-carrier Modulation?

(a) Large bandwidth penalty.

(b) Expensive low pass filters to maintain the orthogonality for sub-carrier at Receiver.

(c) The scheme requires N independent RF units and demodulation paths.

(d) The scheme requires a single RF unit and a single demodulation path.

7. Which of the following statement(s) is/are correct regarding wired connections compared

to wireless connections?

(a) Each cable is a different channel.

(b) Signal attenuation is low in wired connections.

(c) Small to no interference in wired connections.

(d) Wired connections are always better.

8. Which of the following statement(s) is/are true about delay spread in the time domain

interpretation?

(a) If the ratio between delay and period of the signal (τ/T) is small, then the intersymbol

interference is negligible.

(b) If the ratio between delay and period of the signal (τ/T) is large, then the inter-symbol

interference is negligible.

(c) Distributed antenna systems can reduce/mitigate the delay spread.

(d) All of the above.

9. Which of the following MIMO gain is/are best relating with the concept of transmitting

different information, creating multiple spatial streams to one or several users?

(a) Diversity gain.

(b) Spatial multiplexing gain.

(c) Array gain.

(d) Interference suppression gain.

Page 10

5 Quiz A4 : C3 - Multi-carrier communications, Article

05a & 05b

5.1 C3 – “Multi-carrier Communications”

1. Which of the following is/are true about adding a cyclic prefix?

(a) It removes ISI but also affects orthogonality.

(b) It removes ISI and ICI while preserving orthogonality.

(c) Regardless of the dekay, orthogonality is preserved.

(d) It comes at the cost of power and spectral efficiency.

2. In the architecture of Orthogonal Frequency Division Multiplexing (OFDM) systems,

which of the following statement(s) accurately reflect(s) the correct understanding of its

components and their function(s)?

(a) The cyclic prefix (CP) in OFDM systems is primarily designed to enhance the system’s

bandwidth efficiency by allowing for tighter frequency packing of the subcarriers.

(b) The use of Fast Fourier Transform (FFT) at the OFDM receiver and its inverse (IFFT)

at the transmitter is primarily to ensure that the signal occupies the entire available

bandwidth, thereby maximizing the spectral efficiency of the system.

(c) OFDM utilizes the Inverse Fast Fourier Transform (IFFT) at the transmitter to convert

the frequency-domain data into a time-domain signal for transmission, and the

Fast Fourier Transform (FFT) at the receiver to convert the received time-domain

signal back into the frequency domain.

(d) The orthogonality in OFDM is achieved by transmitting all subcarriers at the same

power level, ensuring equal signal strength across the spectrum.

3. Which of the following cause(s) the intersymbol interference to be almost completely

eliminated in OFDM?

(a) Automatic repeat request.

(b) Guard time.

(c) Amplifiers.

(d) None of the above.

Page 11

4. Which of the following statement(s) about Orthogonal Frequency Division Multiplexing

(OFDM) is/are correct?

(a) OFDM implements multi-carrier modulation with virtual carriers using IDFT/DFT.

(b) OFDM is less sensitive to non-linear amplifiers and phase noise than single-carrier.

(c) DFT-precoded OFDMA is a method to implement single- carrier like modulation

using an OFDM transceiver.

(d) All of the above.

5. What is/are the reason(s) for splitting up a large bandwidth B into smaller subcarriers?

(a) Getting higher capacity.

(b) Get flat frequency response in each subcarrier.

(c) Avoid needing to use multi-tap equalizers.

(d) Minimzing the inter-symbol-interference (ISI).

6. Which of the below is/are countermeasure(s) for inter-carrier-interference (ICI)?

(a) Send stronger signals.

(b) Adding a cyclic prefix to each subcarrier.

(c) Inserting guard time.

(d) None of the above.

7. Which of the following is/are true about the insertion of a guard time after each OFDM

symbol?

(a) Guard time helps eliminating almost completely the inter-symbol interference.

(b) Guard time should be chosen smaller than the delay spread.

(c) The OFDM symbol length should be chosen such that the guard time does not dominate.

(d) All of the above.

5.2 Article 05a - “5G New Radio: Unveiling the Essentials of the

Next Generation Wireless Access Technology” and 05b - ”5G NR

Release 16: Start of the 5G Evolution”

8. What are the two frequency ranges defined in Release 15 for 5G New Radio?

(a) FR1: 100 MHz–1 GHz and FR2: 1 GHz–10 GHz.

(b) FR1: 200 MHz–5 GHz and FR2: 10 GHz–40 GHz.

(c) FR1: 410 MHz–7.125 GHz and FR2: 24.25 GHz–52.6 GHz.

(d) FR1: 300 MHz–3 GHz and FR2: 3 GHz–30 GHz.

Page 12

9. What is the purpose of Bandwidth Part (BWP) in 5G New Radio?

(a) To increase interference between cells.

(b) To allocate a fixed amount of bandwidth for each user.

(c) To reduce device power consumption by allowing dynamic bandwidth adaptation.

(d) To support only wide bandwidth transmissions.

10. What are the two types of NR synchronization signals?

(a) Primary Synchronization Signal (PSS) and Tertiary Synchronization Signal (TSS).

(b) Primary Synchronization Signal (PSS) and Secondary Synchronization Signal (SSS).

(c) Primary Synchronization Signal (PSS) and Secondary Synchronization Signal (SSS).

(d) Tertiary Synchronization Signal (TSS) and Quaternary Synchronization Signal (QSS).

11. How many layers can the symbols of a single codeword be mapped on for the Physical

Downlink Shared Channel (PDSCH)?

(a) One.

(b) Two.

(c) Up to four.

(d) Up to eight.

12. Which of the following enhancement(s) is NOT included in Release 16 of 5G NR?

(a) Cross-link interference mitigation.

(b) Multiple-input multiple-output enhancements

(c) UE power savings.

(d) Mobile IAB.

13. Which frequency band is anticipated to be the most relevant for IAB?

(a) Low-frequency spectrum.

(b) Medium-frequency spectrum.

(c) Millimeter-wave spectrum.

(d) Infrared spectrum.

14. In NR Release 16 sidelink, what type(s) of communication is/are supported to provide

highly reliable communication links with appropriate QoS characteristics for ITS services?

(a) Unicast only.

(b) Groupcast only.

(c) Broadcast only.

(d) Unicast, groupcast, and broadcast.

Page 13

15. Which of the following is NOT a use case for advanced vehicle-to-anything (V2X) communications

in NR Release 16?

(a) Vehicles platooning.

(b) Cooperative communication using extended sensors.

(c) Advanced driving (including collision avoidance and cooperative lane change).

(d) Video streaming for passengers .

Page