In a wheatstone quarter bridge circuit, of the four resistors in the circuit, all but one resistor has a resistance of 12.5kΩ . Which of the following values best represents a practical resistance value for the only resistor that is not 12.5kΩ?

- A. 15 kΩ
- B. 10.5 kΩ
- C. 12.75 kΩ
- D. 11.75 kΩ

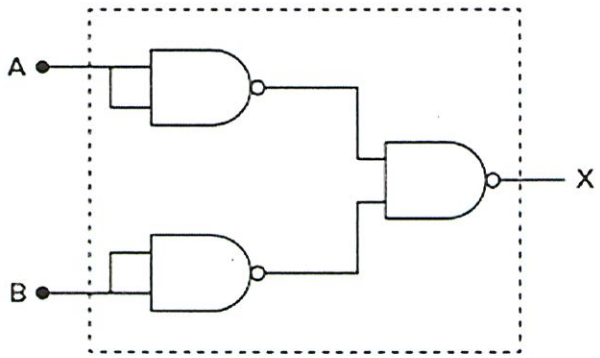
practically you should be as close as possible to the other resistor values. 12.75K is the closest value.

Given a signal of 10.5 Hz, what is the minimum sampling frequency needed to reconstruct the signal?

- ○ A. 21
- ○ B. 10.5
- ○ C. 31.5
- ○ D. Unable to determine

nyquist says you must sample at greater than 2xf in order to reconstruct the signal

The shaded area indicates a logic gate showing internal logic. A and B are the inputs, and X is the output. What kind of gate does this represent?



- A. AND
- B. OR
- C. NAND
- D. NOR

In an 8-bit binary adder/subtractor circuit, what will be the output signal for the operation of A-B when A = 15 and B = 50?

- A. 0010 0011
- B. 1101 1101
- C. 1010 1001
- D. 0011 1001

Determine the value of a resistor needed to obtain a cutoff frequency of 8 Khz in a series RC low-pass filter. The capacitor is 2 nf.

$$f = 1/(2 \times pi \times R \times C)$$

solve for R

- A. 1 kΩ
- B. 9.9 kΩ
- C. 12 kΩ
- D. 8.5 kΩ

Which of the following characteristic equations can represent a stable system?

1 $2s^3$ $2s^2$ $10s$ 2

2 s^3 $2js^2$ $2s$ 10

3 s^3 $2s^2$ $10s$ 2

4 s^3 $10s$ 2

only characteristic equations with poles located in LHP

A. 1

B. 2

C. 1 and 3

D. 1, 2, 3, 4

Determine the maximum signal-to-noise quantization ratio for a 16-bit ADC.

○ A. 32 dB

○ B. 58.4 dB

SNR (db) = 6.02 x n where n is the number of bits.

○ C. 96.32 dB

○ D. 100 dB

Ques: how many want to go into industry vs academia?

Starting an engineering career can be challenging!

Here are some tips (we'll discuss these in greater depth later)

① Identify your goals

where do you want to be career-wise 2 years from now? 5 yrs? 10 years?

need a plan of action
success requires a clear understanding

② Invest in yourself

never stop professional development

- technology is rapidly advancing
- improve existing skills; learn new ones
- need grad degree to remain ~~competitive~~ competitive

discuss control over the years
engr.

③ get out of comfort zone

with career options ↑ staying there gets you nowhere

engr is a diverse field. Explore different sectors that align with skill set goals, and interests. e.g., aerospace, defense, energy

or networking

(4) Build long-lasting connections

take time to develop fruitful relationship with
- peers
- colleagues
- supervisors

network goes beyond exchanging contact details

take time to develop professional relationships and personal relationships

* Note: ~~don't rely on networking to advance your career~~ solely

* Note: don't rely solely on networking to advance you career

focus on improving yourself so others will want to associate with you

(5) Work on soft skills

yes, engr is a technical field, but you can't advance without developing soft skills

Such as

- problem solving skills
- communication
- time management
- conflict resolution
- teamwork
- reliability

(see next pg)

6. Maintain a health work/life ~~Balance~~

engr can be stressful

resist the urge to bury yourself in endless tasks

yes, it might give you a step ahead of your peers but it isn't emotionally or mentally ~~beneficial~~ health

- take breaks (e.g. don't work thru lunch)
- spend time with loved ones
- engage in hobbies

Don't compromise mental or emotional health just for a promotion or proj ~~deadline~~ deadline

Finally, becoming successful doesn't happen by chance

It requires dedication and hard work

But it should never compromise a work/life balance

* put your hand in a bucket of water. Pull it out. the hole left is how much you'll be missed when you leave

---

in-Class Exercise

Define what success means
each group lists 5 things
on white-board

(no speaking assignment)

Time mgmt skills

- **prioritization** (of tasks)
  - urgent tasks ⇒ must finish ASAP
  - important " ⇒ critical but more flexible
- **planning**
  - create a schedule
    - how much time to complete
- **delegation**
  - prevents overloading
  - consider assigning tasks to other team members
- **setting boundaries**
  - learn to say no (don't have the time)
  - practice being assertive about your workload
- **focus**
  - organize workspace
  - avoid distractions
  - do one task at a time

Public speaking

Class exercise

① everyone stand

② discuss for 2 minutes what your plans are over XMAS Break

everyone speaks

③ Two in group sit down other one goes around table

one one speaks

Tell what you are doing over thanksgiving ~~break~~

1 MIN

Lesson - what's the difference?

in ③ people seated in front of speaker

Show public speaking video

* separate topic on whiteboard

* Values are the
  - standards
  - principles
  - qualities

  } put in sentence

deemed worthwhile & desirable

* personal values are the core aspect of your identity

Ques: why are values important?

ans: * individuals motivated to act — i.e. behave — in ways that express those values

* Simply put values lead to behavior

you hear a lot today about sustainability

what supports & promotes it?

ANS: Not just knowledge of it

But an individuals behavior + skills

SO Values leading to behavior is important

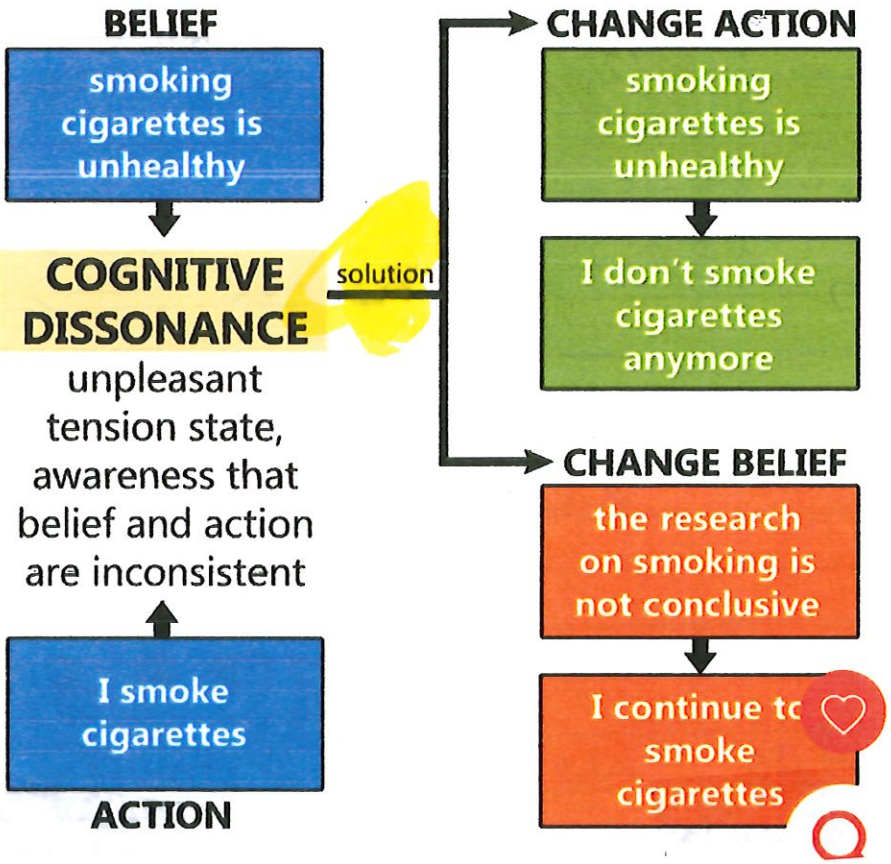
Def (cognitive dissonance)

* the mental discomfort that arises when values conflict beliefs or actions

Sug People seek consistency in attitudes and perceptions to avoid these conflicts

e.g.

*



Cognitive dissonance plays a significant role in decision-making.

It's a driving force behind many rationalizations and justifications people make for their actions, especially when faced with evidence contradicting their beliefs or behaviors.

Major Impacts Of Cognitive Dissonance In The Workplace

- reduced productivity

mental preoccupation diverts attention away from primary responsibilities

- decreased job satisfaction

satisfaction linked to alignment between values and professional environment. eroded when workplace demands compromises beliefs.

e.g., too many hours vs time spent with family

- increased turnover

if CD persists, employees look for other jobs

- impaired decision making

individuals who experience CD can have cloudy perceptions; choices made to allieveate CD rather than clear, objective data

- communication breakdowns

employees experiencing CD may intentionally withhold info or not participate in discussions to prevent further discomfort.

- decreased morale

morale is a collective sentiment within a workplace.

grappling with CD can create a somber atmosphere

- stress/burnout

CD that persists becomes emotionally taxing

- impaired team cohesion

A cohesive team thrives on trust, understanding, and clear communication

As individuals try to navigate their discomfort, they might become less open to collaboration or more defensive about their choices.

Companies have modi diversi of dealing with CD at lavoro

- open communication
  create culture where employees feel free to express themselves
- trng/workshops
  equips employees with coping skills
- flexible/autonomy
  give employees some autonomy in how the complete tasks (they can align them with their values)
- encourage breaks
  help alleviate stress from CD

Values @ small group/team level

Values held in common determine productivity & culture of the team

What is the "culture" of a design team?

Ans: collection of shared values, beliefs, behaviors and working practices of the team members.

Every team has a culture. It defines how you interact and what

** Tell me what is important to the team

~~Ans: ever~~

~~*~~ Discussion GRP ★

Topic: ~~What is a good team culture?~~ ~~What are its properties~~,

- ~~strong & plentiful shared values~~

and what are

Group discussion

Here are some of the major elements of a great team culture:

- Clearly defined purpose and goals
- Alignment on team values & working practices
- Space for personal and professional growth
- Regular opportunities for open, honest discussion

- Flexible working hours
- Wellbeing programs
- Supportive policies on illness and vacation
- Opportunities for cross-function collaboration and connection
- Team code of conduct
- Transparent, communicative management
- Thoughtful systems for feedback
- Time and space to have fun as a team

Ques: So what group shared values lead to a good culture? / team

foster good engr team culture

Engineering design team culture is **the shared values, behaviors, and practices that guide how an engineering team approaches their work**. It can impact how the team communicates, solves problems, and makes decisions. A strong engineering culture can lead to higher productivity, better collaboration, and increased innovation.

Here are some tips for building a strong engineering design team culture:

- Foster a collaborative environment: Encourage engineers to work together and share their strengths.
- Promote a growth mindset: Provide opportunities for engineers to learn new things and advance their careers.
- Create a safe space for discussion: Encourage objective discussions about what happened, rather than who was at fault.
- Prioritize quality: Emphasize the importance of quality and innovation.
- Create a supportive environment: Make sure engineers feel they can rely on their teammates for help.
- Consider the work environment: The physical environment can impact how employees feel at work.
- Consider team size: Some say the ideal team size is five to seven engineers, but no more than ten.

Good shared values

1) It is important for every group member to complete a fair share of the work.
2) It is important for every group member to do quality work.
3) It is important for every group member to accept responsibility for tasks required to complete work.
4) It is important for every group member to keep commitments to the group.
5) It is important for every group member to assist members who are having difficulty.
6) It is important for every group member to respect feedback from other members.
7) It is important for every group member to provide constructive feedback to other members.
8) It is important for every group member to respect and listen to the ideas and viewpoints of other members.
9) It is important for every group member to participate in group meetings.
10) It is important for every group member to communicate with other group members outside of meetings.
11) It is important for every group member to monitor and be aware of the progress of the group.
12) It is important for every group member to believe that the group will be successful.
13) It is important for every group member to acquire the knowledge necessary for the group to be successful.

do not copy for overhead projector!!

1) I attend group meetings.
2) I am willing to acquire the knowledge necessary to complete group tasks.
3) I always correct other people's positions.
4) I get bored easily.
5) I let the group know as soon as I know I can't keep a commitment.
6) I want to know what everyone else in my group is doing.
7) I pay attention when other people are talking.
8) I provide more information than is necessary to complete group tasks.
9) I would rather work alone.
10) I use my knowledge of group dynamics to help lead the group to success.
11) I prefer to get work done as quickly as possible.
12) I am one of the hardest workers in my group.
13) I am unable to restate other people's positions.
14) I complete group assignments for which I'm responsible on time.
15) I frequently ask questions to help clarify ideas.
16) I rely on others to provide the knowledge necessary to accomplish tasks.
17) I take the time to get to know others.
18) I rarely stand-up for my own opinions.
19) I don't like it when I am asked to clarify my positions or ideas.
20) I engage group members in my portion of the group work.
21) I am good at summarizing progress.
22) I interact with the group.
23) I don't like meeting with my small group.
24) I rarely complete my portion of the work.
25) I like to make others feel good about their contributions.
26) I respect other people's opinions.
27) I arrive prepared with the necessary materials for group meetings.
28) I do not help group mates when they are having difficulty.
29) I express myself well verbally.
30) I volunteer to take on tasks necessary to complete group work.
31) I do not verbally participate.
32) I produce high quality work.
33) I am able to suggest the next steps the group should take to complete our task.
34) I encourage the group towards success.
35) I like to solve problems in groups.
36) I listen to alternative points of view.

Behavior statements were sorted based on affinity by the research group. For each grouping of behaviors, a value was assigned. The affinity sort, not being the students' perception of how the behaviors and values map together, was then disregarded as it is students' perception of correlations between values and behaviors that is desired for the creation of personalized instructional activities. Like with the behavior statements, the list of values was independently evaluated by faculty in the Psychology, Integrated Science and Technology, Engineering, and Education departments at James Madison University. The resultant 13 value statements follow.

1) It is important for every group member to complete a fair share of the work.
2) It is important for every group member to do quality work.
3) It is important for every group member to accept responsibility for tasks required to complete work.
4) It is important for every group member to keep commitments to the group.

Recent student survey identified several student behaviors

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Engineering Credentials

They bring you credibility (i.e., measurable accomplishments in your career)

*** YOUR responsibility
*** Helps set you apart from others

Professional Engineers (PE) license iSs one good example.

Per esempio,

You are unemployed. You apply to a company along with 20 other applicants. You all have
— a BS
— 5 or more years experience

How does the company decide to hire????

Comment: It's like the SAT. Who does a college decide to admit?

SHOW "why a PE" video

Faccio una domanda: **Is a PE required???**

Risposta: it depends….

(Pose to class)

- Designing bridges?
- Working at Intel (multi-core microprocessor design)
- Designing pacemakers

Show slide on when req'd

Show expert witness slide

PE License requirements:

- 4 anni engineering BS from ABET accredited college
- 4 anni experience under supervision of a PE
- Pass the *fundamentals of engineering exam* (FE exam)
- Pass the *principles and practice of engineer exam* (PE exam)

SHOW YOUR PE LICENSE

FE LINK ON CANVAS

(NOTE: point out number of questions in each area)

PE LINK ON CANVAS

COMMENTS:

1. Take FE as soon as possible (while material is still fresh)
2. Open book/open note exam (Yes, you can bring books)

STATE OF CALIFORNIA
DEPARTMENT OF
Consumer Affairs

STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS

THIS IS TO CERTIFY THAT PURSUANT
TO THE PROVISIONS OF CHAPTER 7, DIVISION 3 OF THE BUSINESS AND PROFESSIONS CODE

GARRISON WAYNE GREENWOOD

IS DULY REGISTERED AS A

PROFESSIONAL ENGINEER

IN

ELECTRICAL ENGINEERING

IN THE STATE OF CALIFORNIA, AND IS ENTITLED TO ALL THE RIGHTS AND
PRIVILEGES CONFERRED IN SAID CODE

DEPARTMENT OF CONSUMER AFFAIRS
BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS
STATE OF CALIFORNIA

WITNESS OUR HAND AND SEAL

CERTIFICATE № 10279

THIS 19TH DAY OF MARCH 1980

STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

Dwight E. Gilfillan
SECRETARY

Don H. Nance
PRESIDENT

THIS CERTIFICATE IS THE PROPERTY OF THE STATE OF CALIFORNIA AND IN THE EVENT OF ITS SUSPENSION, REVOCATION OR INVALIDATION FOR ANY REASON IT MUST UPON DEMAND BE RETURNED TO THE STATE BOARD OF REGISTRATION FOR CIVIL AND PROFESSIONAL ENGINEERS

Board for Professional Engineers, Land Surveyors, and Geologists

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Sacramento, CA 95833-2944
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Toll Free: (866) 780-5370
www.bpelsg.ca.gov

CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS

Electrical Engineer

Certificate No.
E 10279

Expiration
9/30/2026

GARRISON WAYNE GREENWOOD
1900 SW 4TH AVE SUITE 160
PORTLAND, OR 97201-5350

Signature Garrison Greenwood

Receipt No.
42182590

Maintaining a PE

Some states require proof of continuing education when renewing the PE license.

SHOW MT REQUIREMENTS

(you must click the download arrow in the upper right corner to see the entire webpage)

Domanda: what qualifies as a continuing education unit (CEU)?

Risposta: To qualify as a CEU a course must

1. Define the learning objectives
2. Require learners to demonstrate their understanding of the material. Can use
    - Quizzes
    - Written assessments
    - Group discussions

Generally speaking, one contact hour of instruction, presentation or study = 1 PDH

And

10 contact hours = 1 CEU

Passive voice

= ~~you~~ object becomes the subj of sentence

active is stronger, more direct

active

Mateo kicked the ball

(do first)
passive

the ball was kicked by Mateo

Student examples (passive)
excessive use of

- if . . . . , then . . . .
- when . . . . , it . . . .

Life Long Learning

Show LLL.pptx on canvas

Defn (LLL)

Continuous process of acquiring new knowledge & skills throughout one's life

---

includes both formal & informal methods

it enables engrs to
- stay current with chgs in their field
- acquire new competenci
- expand existing skill set

Benefits:

① Increased knowledge & skills

continuous upgrading

⇓

- improve ability to analyze complex problems
- make informed decisions
- provide innovative solns thereby creating value for their organizations

② Improved job performance & productivity

acquiring new knowledge/skills

⇓

- more efficient at completing tas
- more effective at problem solvin
- helps avoid costly mistakes