

Part I. Answer these questions by marking the best answer among the choices given: [5 points each]

1. Engineers who believe others are guilty of unethical or illegal practice should ...
 - a. Tell everyone about that to expose them
 - b. Present such information to the proper authority for action (*)
 - c. Keep silent in order to protect the reputation of the engineering profession
 - d. Confront them with that information and ask them to stop
2. When an engineer believes a project will likely not be successful, he should ...
 - a. Keep silent to avoid punishment
 - b. Prepare ahead with good excuses to give when it fails
 - c. Advise their clients or employers with that information (*)
 - d. Withdraw from the project team without giving reasons
3. Engineers shall undertake assignments only when they are ...
 - a. Financially rewarding
 - b. Afraid of getting punished or fired
 - c. Qualified by education or experience in the specific technical fields involved (*)
 - d. No one else is available in the specific technical fields involved
4. For a 60 Hz current, it is harmful to expose the patient to currents more than ...
 - a. 0.5 mA
 - b. 1 mA
 - c. 5 mA (*)
 - d. 50 mA
5. The let-go current for a high frequency (e.g., 10 KHz) current is ... that of a 60 Hz current.
 - a. Lower than
 - b. Higher than (*)
 - c. Similar to
 - d. Nearly same as
6. Fixed (not mobile or portable) medical equipment should pass ...
 - a. Inward force and impact test (*)
 - b. Handle test
 - c. Drop test
 - d. Step test
7. The mechanical barriers that prevent germs from penetrating into our bodies include ...
 - a. White blood cells
 - b. Stomach acid
 - c. Skin (*)
 - d. All of the above
8. To ensure killing of bacterial spores on surgical instruments, one must use ...
 - a. Chemical disinfection
 - b. Physical disinfection
 - c. Sterilization (*)
 - d. All of the above
9. Engineers may not express publicly technical opinions that are motivated by ...
 - a. Knowledge of the facts
 - b. Competence in the subject matter
 - c. Objectivity and truth
 - d. Personal interests (*)
10. To reduce risk of exposure to droplet transmission of disease, one should maintain ...
 - a. Respiratory protection
 - b. Gloves and gown
 - c. Chemical disinfection of hands
 - d. Distance of at least 1m to patients (*)

Part II. Mark the following statement as either True (T) or False (F): [3 points each]

11. Professional ethics are rules of conduct recognized in respect to what is right and what is wrong. (F)
12. Biomedical engineers should try to provide services outside of their competence areas. (F)
13. Engineers may choose not to disclose potential conflicts of interest related to their project. (F)
14. Engineers can accept gifts from suppliers or contractors doing business with their companies. (F)
15. According to Kohlberg's theory, moral vs. professional developments are related. (T)
16. It is not possible for a person to suffer a microshock while an ECG is used on him. (T)
17. When several medical devices are connected to a patient, all of them must be connected to earth. (T)
18. For a surgical cutting device, it should cut only while the surgeon is pressing a button. (T)
19. Washing the skin eliminates 90% of permanent bacterial colonization in the skin. (F)
20. For environmentally-friendly disinfection, physical disinfection should be used whenever possible. (T)

Part III. Answer the following questions:

21. Analyze the following situations from the ethical perspective and justify your analysis by pointing out the relevant ethical guidelines: [5 points each situation]
 - a. An engineer who uses proprietary designs from former clients in a new project after having permission of these clients.
 - b. An engineer who accepts an outside part-time employment without informing employer.
 - c. An engineer may offer a valuable gift to a hospital administrator to win a contract.

Answer:

(a) Yes, this is an ethical behavior.

(b) No, this is not an ethical behavior since it breaks the following fundamental canon:

Act for each employer or client as faithful agents or trustees

(c) No, this is not an ethical behavior since it breaks the following fundamental canon:

Engineers shall avoid deceptive acts

22. Compute the maximum current that could flow through the subject in the situations below assuming a 60 Hz supply current and that the skin of the subject is NOT intact (that is, the electricity is connected to places where skin suffer cutting wounds). [10 points]

Since skin is not intact, it may have no resistance at all and the only resistance the voltage will see is the torso resistance = 500 Ohm. Hence, compute maximum current = $V/R = 230/500 = 0.46A$.

