Medical Equipment III – Part 3 Term Exam – January 2011 (Model Answer)

Solve as Much as You Can – Maximum Grade for Part 3: 25 Points

Part I. Answer these questions by marking the best answer among the choices given (1 point each):

1. In the label design model, the label design is not involved in the … stage.
    a. Detect
    b. Read
    c. Decide (*)
2. Medical device labels should be designed for …
    a. Visibility
    b. Legibility
    c. Both of the above (*)
3. Labels for equipment identification must include …
    a. Serial number
    b. Electrical rating (*)
    c. Address of manufacturer/distributer
4. A good method for ensuring permanence and durability of medical device labels is to use …
    a. Etched molding (*)
    b. Color coding
    c. Background shading
5. Environmental considerations provide …
    a. risk management strategies for high risk environments
    b. ways to design the physical environment for medical device use
    c. design approaches that can help overcome poor use conditions (*)
6. Medical devices are parts of …
    a. Physical environment
    b. Clinical environment (*)
    c. Both of the above
7. Based on Balanced Noise Criterion Curves, for NCB value of 30, the sound pressure level at 250 Hz should be …
    a. 20 dB
    b. 30 dB
    c. 40 dB (*)
8. Maximum temperature for skin contact for patient-applied part should never exceed …
    a. 86°
    b. 80°
    c. 60° (*)
9. Medical domain has unique anthropometric challenges such as …
    a. Extracorporeal devices
    b. Implanted components (*)
    c. Design for adjustability
10. A medical device should require a maximum of … the maximum strength of users.
    a. Twice
    b. Half
    c. One-Third (*)
11. Based on the fatigue curve, a user can exert nearly … of his maximum muscle strength for 5 minutes before fatigue.
    a. 50%
    b. 30%
    c. 15% (*)
12. Reaction time of humans is fastest for … stimuli.
    a. Auditory
    b. Visual
    c. Tactual (*)

13. Positive transfer in human factors engineering means …
    a. users applying past experience to a new device, reducing their learning time (*)
    b. designers using past experience to design a new device user interface
    c. feedback from usability testing making devices more error-tolerant
14. Developing compatible medical device designs involve …
    a. Knowledge of other devices in contact with the target device in the clinical environment
    b. Accommodating mental models (*)
    c. Effective choice of biomaterials for safety
15. Omitting steps in a device operating procedure is classified as …
    a. Slip
    b. Lapse (*)
    c. Mistake
16. …… is the apparent change in the position of an object because of changes in the observer's line of sight.
    a. Visual illusion
    b. Motion error
    c. Parallax error (*)
17. For colored lights, the easiest colors to be recognized by color normal people are … and …
    a. Red , Green (*)
    b. Blue , white
    c. Yellow , Orange
18. Identification of both individual elements and their functional relationships in the medical device user interface can be best done through …
    a. Appropriate markings and labeling (*)
    b. Design changes
    c. Using FMEA

Part II. Mark the following statement as either True (T) or False (F) (½ point each):

19. Medical device labels should be resistant to wear and tear. (T)
20. Hazard labels alert personnel to possible hazards that could be encountered only during the use of a device (F).
21. Medical device labels should be oriented horizontally. (T)
22. Medical device package labels include only shipping and storage requirements. (F)
23. Medical devices are used in diverse environments such as homes or public spaces. (T)
24. Medical device designers should only consider clinical environmental factors. (F)
25. Medical devices should not increase relative humidity. (F)
26. Battery-operated devices must have battery status indicator in their user interface. (T)
27. Good anthropometric design of medical devices should accommodate the whole range of human physical dimensions. (F)
28. Muscular endurance is a function of the amount of strength exerted. (T)
29. Humans make better absolute judgments than relative judgments. (F)
30. Humans allow one source of sensory data at any instant. (F)
31. It is necessary to mitigate abnormal use by a user who actually intends to use a device incorrectly. (F)
32. Usability test participants should include someone from the design team in addition to doctors and nurses. (F)
33. Intended use of a medical device includes clinical application and use environment. (F)
34. Unattended sensory input channels are incompletely processed. (T)
35. Humans can shift priorities between sensory tasks based on perceived importance. (T)
36. For better reaction time, visual stimuli are better than auditory stimuli. (F)
37. Reaction time may change for the same person during the work day. (T)
38. Laboratory skills are stored in the declarative long-term memory. (F)
39. Humans tend to overestimate the weight of an object if it is compact in size. (F)
40. Hands should be relieved of work that can be performed by feet. (T)
41. Limb movements terminated by a mechanical stop are less efficient than those terminated solely by visual cues. (F)
42. Reaction time for auditory alarms is usually faster than that for visible alarms. (T)
43. When possible, medical monitoring device designs should help users forecast patient variables. (T)
44. Mistakes arise from applying the wrong knowledge when making a decision. (T)

Best of Luck!