



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : TELEMEDICINE
COURSE CODE : BEU 40803
PROGRAMME : BEJ
EXAMINATION DATE : DECEMBER 2017/JANUARY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS
IN THIS QUESTION PAPER

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THIS QUESTION PAPER CONSISTS OF **FOURTEEN (14)** PAGES

Q1 (a) Telemedicine can be defined using different terms which are telemedicine, telehealth and telecare.

(i) Differentiate between the terms telemedicine and telehealth.

(4 marks)

Solution:

(ii) Draw the connection between all three terms in **Q1(a)**.

(3 marks)

Solution:

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- (iii) Explain why the term telehealth has been coined in addition to the term telemedicine.

(2 marks)

Solution:

- (iv) Suggest **TWO (2)** groups of patients that could be benefited from telecare services.

(2 marks)

Solution:

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(b) Analyze the following type of telemedicine by giving **ONE (1)** example of situation related to each term.

(i) Teleconsultation

(2 marks)

Solution:

(ii) Teleeducation

(2 marks)

Solution:

(iii) Telepresence surgery

(2 marks)

Solution:

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- (c) Explain any **TWO (2)** of the technological drivers that support the development of telemedicine system.

(4 marks)

Solution:

- (d) The use of telemedicine system may create poor relationship between the parties involved. Justify how can the poor relationship happens between;

- (i) Patient and carer.

(2 marks)

Solution:

- (ii) Healthcare professionals.

(2 marks)

Solution:

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- Q2** (a) Differentiate between deterministic and stochastic signals by giving the definition and an example of the signal for both types of the signals.

(4 marks)

Solution:

- (b) For **Q2(b)(i)-(v)**, based on given conditions/examples, classify the type of signal into either deterministic, stochastic, fractal or chaotic;

- (i) Spread of disease in recurring epidemics. _____
- (ii) Noise generated by electronic components in instrumentation.

- (iii) An exponential function. _____
- (iv) The current through a single ionic channel of a cell membrane.

- (v) The beat-to-beat heart rate signal. _____

(5 marks)

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- (c) Compare between image enhancement, segmentation and classification in terms of its purposes and example of techniques related to each image processing steps. (6 marks)

Solution:

- (d) There is a wide variety of classification methodologies that one may choose to apply. Analyze the sentences in **Q2(d)(i)-(iv)** and deduce the classification methods related to it.
 - (i) Multiple simple classifiers are combined to minimize the error margin. _____
 - (ii) Follows massively parallel architecture quite similar to that of neurons in the human brain. _____
 - (iii) The examined case is compared directly to other cases in the medical history, and similarities are used in order to provide a most probable diagnosis. _____
 - (iv) Offer an alternative computing methodology that reaches a decision through consecutive, simple question and answer sessions. _____

(4 marks)

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- (e) Total recorded number of medical cases in a clinic are as below;

Correct healthy estimation = 77

Correct illness estimation = 71

Illness estimation for a healthy case = 7

Healthy estimation for an ill case = 17

Assess the accuracy, sensitivity and specificity of the above cases.

(6 marks)

Solution:

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Q3 (a) Body Area Network (BAN) is the technology that allows very tiny radio transmitting devices to be securely installed on a human body.

(i) Describe **TWO (2)** major components of BAN.

(4 marks)

Solution:

(ii) Antenna design is one of the issues regarding BAN. Propose **TWO (2)** criteria that must be met in order to design a good antenna for BAN system.

(4 marks)

Solution:

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- (iii) When developing a BAN system, several concerns exist regarding the sensors used. Explain on the concerns in term of calibration and standard. (4 marks)

Solution:

- (b) Telemedicine for healthcare can also facilitate the general public in maintaining good health in many activities, including for swimming. Summarize on how can a system that allows small transceivers to be brought with a swimmer can potentially save lives.

(5 marks)

Solution:

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- (c) Irrespective of their legal systems, most democratic countries now base their modern practice of patient confidentiality on the three guidelines. Explain any **TWO (2)** of them.

(4 marks)

Solution:

- (d) Every competent adult has a right to refuse or give consent to available medical treatment or healthcare. Explain the clinical and legal purpose of the consent.

(4 marks)

Solution:

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Q4 (a) Electronic Health Records (EHRs) is an electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards. It can be created, managed, and consulted by authorized clinicians and staff across more than one healthcare organization.

(i) Discuss **THREE (3)** reasons the EHRs is needed.

(6 marks)

Solution:

(ii) Two main key components available in any EHRs system are Computerized Physician Order Entry (CPOE) and Clinical Decision Support System (CDSS). Differentiate between CPOE and CDSS.

(4 marks)

Solution:

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(iii) State any **THREE (3)** barriers in adopting the EHRs system.

(3 marks)

Solution:

(b) According to the American Health Information Management Association (AHIMA) the Personal Health Record (PHR) is an electronic, universally available, lifelong resource of health information needed by individuals to make health decisions.

(i) Describe **FOUR (4)** ideal features every PHR should have.

(4 marks)

Solution:

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- (ii) Compare between **TWO (2)** available PHR formats.

(4 marks)

Solution:

- (iii) In your own words, summarize how PHR can be interoperable.

(4 marks)

Solution:

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– END OF QUESTION –