UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	TELEMEDICINE
COURSE CODE	:	BEU 40803
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	DECEMBER 2019/JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1   (a)   Four different types of telemedicine are teleconsultation, tele-education, telemonitoring and telesurgery.

     (i)   Describe the terms teleconsultation and tele-education.

           (4 marks)

     (ii)   Academic study via the Internet and public education via the Internet are two types of tele-education. Distinguish between these types depending on who is the recipient and what is the purpose of the transmission.

           (4 marks)

     (iii)   Telesurgery can be practised in two ways. Explain both methods that can be used to practice telesurgery.

           (4 marks)

  (b)   Better access to healthcare and access to better healthcare are the benefits claimed for telemedicine. Based on your understanding, compare these two benefits by elaborating both in details.

           (6 marks)

  (c)   List **FOUR (4)** limitations of telemedicine.

           (4 marks)

  (d)   Explain **ONE (1)** example of non-technological drivers in telemedicine.

           (3 marks)

Q2   (a)   Differentiate between electromyogram (EMG) and electroencephalogram (EEG) test.

           (4 marks)

  (b)   List **FOUR (4)** classification of signals.

           (4 marks)

  (c)   For **Q2(c)(i)** and **Q2(c)(ii)**, classify the type of signal. Justify your answers.

     (i) $x(t) = 5 \cos 10t$

           (3 marks)

     (ii)   The three-dimensional coordinates of the path traced by the movements of a molecule of oxygen deep in the lung.

           (3 marks)

  (d)   Draw the flowchart of general steps in image processing.

           (5 marks)

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(e)   Name the process in image analysis that divides an image into sets of wanted and unwanted regions. Discuss the importance of that process in image processing.

(6 marks)

Q3   (a)   Body Area Network (BAN) is a technology that allows very tiny radio transmitting devices to be securely installed on a human body for monitoring various signs of the body and to automatically issue an alert should an abnormal behavior is detected.

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

(4 marks)

(ii)   In any BAN system, antenna design is one of the issues that need to be carefully taken into consideration. Suggest **TWO (2)** criterias of a good antenna design.

(4 marks)

(b)   Telemedicine offers the solution for emergency rescue as it can minimize the time to provide treatment and could be lifesaving. Based on **Figure Q3(b)**, elaborate the emergency rescue system.

(6 marks)
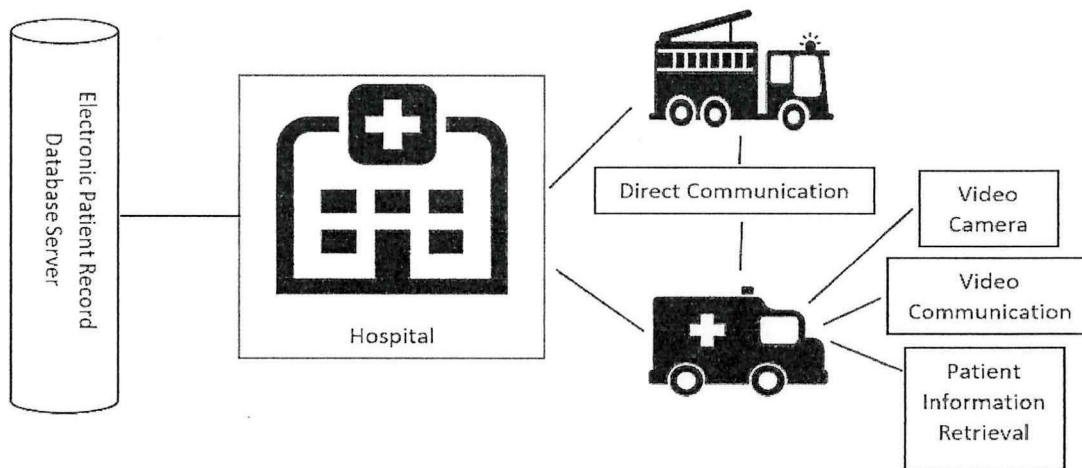
A Simple Emergency Rescue System

Figure Q3(b)

(c)   Remote recovery often involves swift discovery of the patient's exact whereabouts, and any potential hazards to the rescuer from the patient can be ascertained to avoid putting them in danger. Suggest **TWO (2)** situations where telemedicine frequently helps to save lives of both the general public and professionals who risk their lives to rescue them.

(4 marks)

(d)   List **THREE (3)** medical application that implement the usage of radio frequency identification (RFID) system.

(3 marks)

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(e)   Differentiate between **TWO (2)** types of data compression methods available in terms of definition, compression rate and example.

(4 marks)

Q4   (a)   Patient Informatics is a new aspect of Medical Informatics that largely reflects the empowered healthcare consumer.

(i)   Distinguish between two main topics in Patient Informatics; Patient Medical Education (PME) and Patient Web Portals (PWP).

(4 marks)

(ii)   Suggest **TWO (2)** reasons for the increased use of the Internet in healthcare.

(4 marks)

(b)   Personal Health Records (PHRs) is an electronic, universally available, lifelong resource of health information needed by individuals to make health decisions.

(i)   List **THREE (3)** ideal PHRs features.

(3 marks)

(ii)   Compare between **TWO (2)** PHRs formats; tethered and untethered.

(2 marks)

(c)   Recently, a promising wireless telemedicine technology called a medical sensor network (MSN) has been proposed to monitor changes in patients' vital signs closely and provide feedback to help maintain an optimal health status. Based on **Figure Q4(c)**, determine the components involved in a MSN network. State as well the functions of each components.
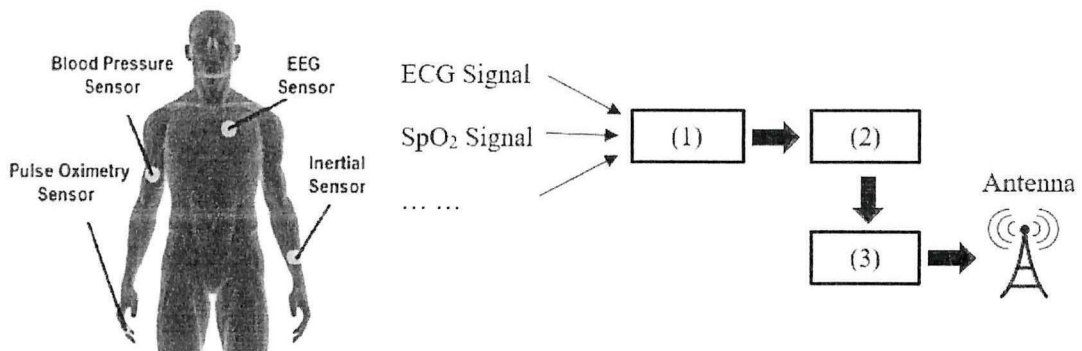
(6 marks)

Figure Q4(c)

(d) In patients' home, a range of possibilities can be offered in integrating smart home technology with telemedicine, where artificial and computational intelligence play an important role in providing assistive technology for the purpose of managing medication, reducing isolation, and cooking function. Suggest **ONE (1)** assistive technology to the elderly at home for each purpose.

(6 marks)

– END OF QUESTIONS –

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