Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	TELEMEDICINE
COURSE CODE	:	BEU 40803
PROGRAMME	:	BEJ
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS IN THIS QUESTION PAPER

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

Q1 (a) There are four phases of telemedicine development based on utilising telecommunication and information technologies. State any **THREE (3)** development phase of telemedicine.

(3 marks)

(b) Telemedicine can be identified into four different types including telemonitoring, teleconsultation, teleeducation, and telesurgery.

(i) Differentiate between telemonitoring and teleconsultation by giving the definition and an example of situation related to telemonitoring and teleconsultation.

(6 marks)

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

(4 marks)

Q2 (a) The sources of biomedical signals are infinite in variety and are found in many forms. Describe **TWO (2)** of the biomedical signal.

(4 marks)

(b) Signal can be either in continuous-time (CT) or discrete-time (DT).

(i) Tabulate the difference between CT and DT in terms of its definition and form of representation.

(4 marks)

(ii) Give an example for each of the signal mentioned in **Q2(b)**.

(2 marks)

(c) Analyze the graph in **Figure Q2(c)** and obtain its DT signal if the sampling rate is:

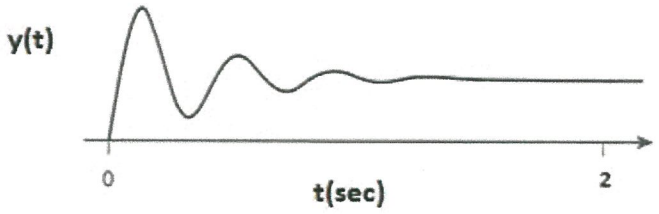

Figure Q2(c)

(i) 10 samples/second.

(3 marks)

(ii) 15 samples/2 seconds.

(3 marks)

(d) For **Q2(d)(i)-(ii)**, classify each of these signals whether it is deterministic, stocastic, fractal or chaotic signal.

(i) $x(t) = 0.5 \cos(6\Omega t) + 14tu(t)$

(1 mark)

(ii) The current through a single ionic channel of a cell membrane.

(1 mark)

(e) Justify your answers in **Q2(d)(i)-(ii)**.

(2 marks)

Q3 (a) Differentiate between image enhancement, segmentation and classification in terms of its purposes and example of techniques related to each image processing steps.

(6 marks)

(b) The general steps taken to process and analyse each images consists of image enhancement and image analysis. Draw the flowchart of the process.

(5 marks)

(c) A similar set of questions has been asked to different patients to study on the successful rate of the embryo implantation. The result shows that successful patients have more than one embryo transferred (NUM_TRANS> 1), have no additional hormonal stimulation FLARE = 0), are of age less than or equal to 40 (AGE $\leq$ 40), and have no trauma during plantation of the embryos (TRAUMA = 0). Based on the result mentioned, design the decision tree classification method for future reference of similar cases.
(Hint: You may use '0' for fail condition and '1' for successful condition)

(10 marks)

Q4 (a) An emergency rescue system is capable of providing paramedics a convenient medium for sending a large amount of information about an injured person to the hospital so that necessary preparations can be done prior to the patient's arrival. Identify the issues that might occur throughout the above process for both at the scene and at the hospital.

(8 marks)

(b) At the hospital, telemedicine links can be utilized in many situations including for teleradiology, telesurgery and people tracking. Justify the previous sentence.

(6 marks)

(c) Data compression can be categorized in two forms; lossy and lossless. Compare these two forms in terms of its definition, compression rate, and size of the output data.

(6 marks)

Q5 (a) State the **FOUR (4)** pilot applications for telemedicine development in Malaysia.

(4 marks)

(b) 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) Point out **THREE (3)** reasons why EHRs is needed.

(6 marks)

(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)

(iii) Identify **FOUR (4)** barriers in adopting the EHRs system.

(4 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. Construct the block diagram of MSN system and describe the components available in the system.

(8 marks)

– END OF QUESTION –