



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020**

COURSE NAME : TELEMEDICINE
COURSE CODE : BEU 40803
PROGRAMME : BEJ
EXAMINATION DATE : JULY 2020
DURATION : 3 HOURS 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS.
OPEN BOOK EXAMINATION

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

CONFIDENTIAL

TERBUKA

Q1 Telemedicine can be identified in four different types namely telemonitoring, tele-education, teleconsultation and telesurgery.

(a) Define any **TWO (2)** types of telemedicine that mentioned above. (3 marks)

(b) Based on any **ONE (1)** type mentioned in **Q1(a)**, suggest a telemedicine system/application that could help in current pandemic Covid-19 situation. Your suggestion must consist of elaboration on signal (if applicable), processing and transmission, and justification. You may also use any appropriate diagram to support your elaboration. (10 marks)

(c) Based on your answers in **Q1(b)**, discuss the benefits to:

- (i) Medical practitioners
- (ii) Government
- (iii) Authorities
- (iv) Public

(8 marks)

(d) Explain **TWO (2)** limitations that relate to your answers in **Q1(b)**. (4 marks)

Q2 (a) A discrete-time signal (DT) can be obtained by sampling a continuous-time signal (CT) at a certain sampling rate. Based on a CT signal given in **Figure Q2(a)**, obtain its DT signal for sampling rate of;

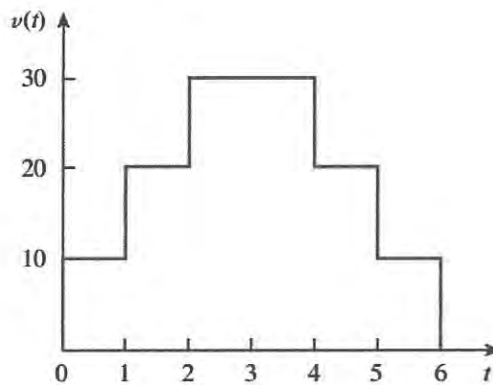


Figure Q2(a)

- (i) 1 sample/s.
- (ii) 4 samples/s.

(6 marks)



- (b) Signals can be either in the form of deterministic, stochastic, fractal or chaotic. State **TWO (2)** examples of deterministic and fractal signal, respectively. Justify your answers.

(6 marks)

- (c) **Figure Q2(c)** shows an MRI image of a patient with brain tumor (white region). Suggest **TWO (2)** steps in image processing that could be used for detecting the brain tumor in the image. Explain the purpose of the steps, and the example of technique available to be used.

(6 marks)

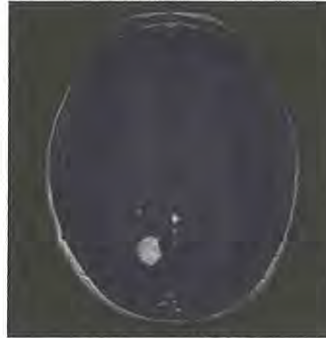


Figure Q2(c)

- (d) Decision tree is a method of image classification methodology that reaches a decision through consecutive, simple question and answer sessions. Based on below statement, design a sample of decision tree classification.

It is indicated that the successful patients that underwent embryo plantation have more than one embryo transferred ($NUM_TRANS > 1$), have no additional hormonal stimulation ($NUM_STIM = 0$), are of age less than or equal to 40 ($AGE \leq 40$), not an alcoholic ($ALC = 0$), not a smoker ($SMO = 0$), and have no trauma during plantation of the embryos ($TRAUMA = 0$).

(Hint: You may use '0' for fail condition and '1' for successful condition)

(6 marks)

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

Correct healthy estimation = 88

Correct illness estimation = 81

Illness estimation for a healthy case = 8

Healthy estimation for an ill case = 18

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

(6 marks)

- Q3** (a) Wireless technology can be used for patient monitoring in Emergency Rescue System (ERS).
- (i) Draw/Sketch a diagram for a simple ERS system. (4 marks)
 - (ii) Point out possible communications that could take place in ERS during an accident. (4 marks)
 - (iii) List **THREE (3)** examples of wireless devices that could serve the paramedics at the scene. (3 marks)
 - (iv) Discuss the issues or challenges that might occur at the scene and hospital, respectively. (4 marks)
- (b) As a biomedical engineer, you are asked by your company to propose a telemedicine system or application relates to Emergency Rescue System (ERS). Design a system or application that could be used by the paramedics to improve the process of emergency rescue. Your suggestion must consist of elaboration on signal (if applicable), processing and transmission, and justification. You may also use any appropriate diagram for elaboration. (10 marks)
- Q4** (a) Based on your understanding on Malaysia Health Vision (MHV), analyze the current state of MHV progress in Malaysia. (5 marks)
- (b) Electronic Health Records (EHR), Electronic Medical Records (EMR) and Personal Health Records (PHR) are the three terms being used related to health centralized computerization. Based on the definition of EHR, EMR and PHR, evaluate the relation between these terms. (5 marks)
- (c) One of the reasons to use EHR system is due to the need for improved efficiency and productivity. Justify the statement. (5 marks)
- (d) EHR system may leads to financial saving or financial downfall. Elaborate both ways. (5 marks)

– END OF QUESTIONS –