UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

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

TERBUKA

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

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

(3 marks)

Solution:

(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.

(4 marks)

Solution:

(ii)   Teleeducation is the use of telemedicine links to deliver medicine and healthcare oriented educational material. Propose how can teleeducation plays its role to healthcare workers and public respectively.

(4 marks)

Solution:

(c)   For each of the following statements in **Q1(c)(i)–(vi)**, indicate whether they are true (T) or false (F).

(i)   Telemedicine can be simply explained as *Medicine delivered at a distance.*
____

(ii)   Telehealth is the use of information and communication technologies to transfer healthcare information for the delivery of clinical, and educational services. ____

(iii)   Telehealth and telecare can be regarded as subsets of telemedicine. ____

(iv)   Telegraph is the first technology used in the development of telemedicine. ____

(v)   Transmission of electrocardiographs and X-ray from one location to another to provide medical care is known as teleradiology. ____

(vi)   Real-time videoconferencing link to generate interactive feedback to support clinical decision making is an example of telemonitoring.

(6 marks)

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

(4 marks)

Solution:

(e)   Two main benefits of telemedicine are; (i) access to better healthcare and (ii) better access to healthcare. Compare the benefits in (i) and (ii) by elaborating both in details.

(4 marks)

Solution:

4

Q2   (a)   Differentiate between deterministic and stochastic signals in term of its;
(i)   definition.
(ii)   example of the signal.

(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)

(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)

Solution:

(d)   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:

Q3 (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. Analyse the issues that might accur throughout the above process for both at the scene and at the hospital respectively.

(8 marks)

Solution:

(b)   Telemedicine for healthcare can also facilitate the general public in maintaining good health in many activities, including for swimming.

    (i)   Summarize on how can a system that allows small transceivers to be brought with a swimmer can potentially save lives.

                                  (4 marks)

    Solution:

    (ii)   State **THREE (3)** issues that might arise when using underwater communication during swimming.

                                    (3 marks)

    Solution:

(c)   Radio Frequency Identification Devices (RFID) is all about identifying an object using radio frequency signals and it has been used in many medical applications.

    (i)   Describe passive tag used in RFID.

        (2 marks)

        Solution:

    (ii)   RFID has an issue of reliability including tag collision and reader collision. Differentiate between these two types of collision.

        (4 marks)

        Solution:

(iii)   Elaborate how the RFID can be applied at the hospital.

(4 marks)

<u>Solution:</u>

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Q4 (a) In line with Vision 2020, Malaysia's healthcare system is to be transformed.

      (i) State any **FOUR (4)** characteristics of future healthcare systems according to Malaysia's Health Vision.

                                                     (4 marks)

      <u>Solution:</u>

      (ii) Explain any **TWO (2)** pilot applications for telemedicine development in Malaysia.

                                                     (4 marks)

      <u>Solution:</u>

(iii)   With the aid of appropriate diagram, summarize on how Malaysia can transform from industrial age medicine to information age healthcare system.

(8 marks)

Solution:

(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) List any **THREE (3)** reasons why EHR is needed.

(3 marks)

Solution:

(ii) Computerized Physician Order Entry (CPOE) is an EHR feature that processes orders for medications, lab tests, x-rays, consults and other diagnostic. Explain **THREE (3)** advantages of adopting the CPOE system.

(6 marks)

Solution:

– END OF QUESTION –