

رابعة 31
2019

University : Menoufia	Date : 06/01/2019
Faculty : Electronic Engineering	Time : 3 Hours
Department : Industrial Electronics and Control Eng.	No. of pages : 1
Academic level : 4 th Year	No. of Questions : 4
Course Name : Medical Instrumentation	Full Mark : 90 Marks
Course Code : ACE 413	Exam : Final Exam
Academic Year : 2018/2019	Examiner : Dr. ME Karar



Answer all the following questions :

Question No 1 : (20 Marks)

- a) **What are** techniques utilized in physiological measurements ? (10 Marks)
- b) **Give short notes** on respiratory measurements. (5 Marks)
- c) **What are** the possible future technologies of medical sensors? (5 Marks)

Question No 2: (30 Marks)

- a) **Compare between three** different blood flowmeters. (10 Marks)
- b) **How is the extravascular blood pressure sensor** being tested **in frequency-domain**? (5 Marks)
- c) **Design** a critically damped extravascular blood pressure measurement system **with intentional liquid leak** to operate in the frequency response: dc-92 Hz, using a P23Dd sensor at 20 °C. Assuming the catheter has no air bubble. (**Constants:** Density of water at 20°C is 1000 Kg/m³, water viscosity at 20°C is $\eta = 0.001$ Pa.s, 1 cm of water pressure is 98.5 N/m², volume modulus of elasticity of the diaphragm is 0.49×10^{15} N/m⁵). يمكنك فرض أي قيم ممكنة لتحقيق هذا التصميم. (15 Marks)

Question No 3 : (20 Marks)

- a) **Describe** the basic four generations of CT imaging system. (10 Marks)
- b) **Draw and explain** the block diagram of automatic exposure control (AEC) unit. (10 Marks)

Question No 4 : (20 Marks)

- a) **What are the levels** of medical equipment maintenance? (10 Marks)
- b) **How to plan** a preventive maintenance strategy for medical instrument in hospitals ? (10 Marks)

Best Wishes...

Dr. Mohamed Esmail Karar