(c) Describe all the physical principles used in Lithotripter machines. How kidney stone is removed out by using Electro-conductive methods? 6

5. Write short notes on: 4×4=16

(a) Pacing system analyser

(b) Linear accelerator

(c) Safety aspects in electro-surgical units

(d) Clinical Flame Photometers

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PURBANCHAL UNIVERSITY

2018

Bachelor in Biomedical Engineering/Seventh Semester/*Final*

Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32

BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) Is blood gas analytic Instrument? If so, how reflectance photometry measures SPO_2 and Hb?. 6

(b) Explain Improve version Dc Defibrillator machine with schematic block diagram. 4

(c) State two majors functions of Anesthesia machine. How mixture of gas is delivered in this machine. 6

2(a) Describe the method of operation of artificial and positive pressure ventilators. Explain and instrumentation diagram of positive pressure ventilator for recording pressure, temperature and oxygen percentage in inspired air. 8

(b) What is LASER? Discuss the principal of operation of LASER and its major application in medical field. 4

(c) Discuss pure tone audiometer in detail. 4

3(a) What are the method of blood cell counting? Discuss coulter counter in detail. 8

(b) Explain the different methods of automated drugs delivery system. Explain programmable volumetric infusion pump with necessary diagram. 8

4(a) Discuss various type of electrical shock hazard. 4

(b) Draw a neat schematic diagram of hemodialysis machine and explain how conductivity of dialysate is monitored. 6

Contd. ...

PURBANCHAL UNIVERSITY
2016

Bachelor in Biomedical Engineering/Seventh Semester/*Final*
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32
BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer FIVE questions.

1(a) Discuss the differences between spectrophotometry and colorimeter. Explain the working of multi-channel colorimeter with complete block diagram. 8

(b) Differentiate the working of conduction and optical method of blood cell counting. Explain one of them in detail. 8

2(a) Why is dialyzer known as artificial kidney? Explain. Also discuss various types of dialyzers used. 8

(b) Explain the working of complete haernodialysis machine. Also explain the dialysate temperature control circuit. 8

3(a) What is principle of surgical diathermy? Discuss the advantages and disadvantages of using high frequency current for surgical procedure. 8

(b) Discuss the working of typical Electro Surgical Unit with complete block diagram. 8

4(a) Why is pacemaker needed? Explain the modern pacemaker in detail. 8

(b) Explain the working of cardioverter with complete block diagram. 8

5(a) What is Ventilator? Explain its types. 8

(b) Explain the components of drug infusion system. 8

6. Write short notes on any FOUR: 4×4=16

(a) Anaesthesia Machine (b) Argon Laser
(c) Radiotherapy unit (d) Lithotripter

PURBANCHAL UNIVERSITY
2016

Bachelor in Biomedical Engineering/Seventh Semester/*Final*
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32
BEG4B1BM: Biomedical Instrumentation-II

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(b) Explain the working of cardioverter with complete block diagram. 8

5(a) What is Ventilator? Explain its types. 8

(b) Explain the components of drug infusion system. 8

6. Write short notes on any FOUR: 4×4=16

(a) Anaesthesia Machine (b) Argon Laser
(c) Radiotherapy unit (d) Lithotripter

5. Write short notes on: 4×4=16

(a) Working of hearing aids

(b) Infusion pump and its closed loop control

(c) Implantable pacemakers

(d) Electrolyte analysis

PURBANCHAL UNIVERSITY

2019

Bachelor in Biomedical Engineering/Seventh Semester/*Final*

Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32

BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) Explain different types of electro-surgical units with examples. What are the most indispensable components used in surgical diathermy machine? How stray capacitance can route the leakage currents in diathermy machine? 8

(b) Which pathology instrumental method of analysis can give various differential datas for normal and pathological values? Explain its function and components with necessary diagram. 8

2(a) What is the need of Defibrillation? Discuss Defibrillation in short. 4

(b) What are the principles used in lithotripter? How kidney stone is fragmented by using Electro-conductive technique? 6

(c) How Argon laser is transmitted into a gastro-intestinal fiber optic endoscope? Give some important application of laser in medical field. 6

3(a) How the heating of the tissues is carried out by HF AC in short-wave diathermy? How intensity of current regulated in this machine? Discuss application technique of short-wave therapy with suitable diagram. 8

(b) How mixture of gases are delivered in Anesthesia machine? 4

(c) What is Cobalt-60? Discuss in detail. 4

4(a) What is mechanics of respiration? Describe method of operation of ventilator. Draw an instrumentation system for recording, pressure, temperature and percentage of oxygen in inspired our coming from a ventilator. Explain it. 10

(b) What is artificial kidney? How dialysate temperature is controlled in Hollow-fiber dialyzer? Draw its complete diagram. 6

Contd. ...

(b) How stray capacitance can route RF leakage currents to the metallic equipment? What are the differences between macroshock and microshock? Write two most important physiological effects of electric current. 8

5(a) What is high frequency heat therapy? Discuss a short-wave diathermy machine with a complete circuit diagram. 8

(b) Describe ESWL based on piezo-electric method. What are the major components of ESWL? 8

6. Write short notes on any FOUR: 4×4=16

(a) Implantable cardiac Pacemaker

(b) Flame photometer

(c) Mechanism of hearing and bone conduction

(d) Safety aspects in Electro-surgical units

(e) Bladder Stimulator

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PURBANCHAL UNIVERSITY

2017

Bachelor in Biomedical Engineering/Seventh Semester/*Final*

Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32

BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer FIVE questions.

1(a) Describe how an analyte is measured by the principle of colorimetry and spectrophotometry. 6

(b) Explain principle of operation of LASER. How number of excited atoms combined to produce a powerful coherent wave? How ARGON LASER beam is transmitted through a crystal fiber wave guide? Explain with necessary diagram. 10

2(a) How mixture of gas is delivered in Anesthesia machine? Give two important function of it. 6

(b) What are the objectives of closed-loop control in Infusion systems? Explain programmable volumetric Infusion pump. 6

(c) What is cardiometer? Explain its function 4

3(a) What is the method of operation of positive pressure ventilator? How pressure, temperature and oxygen percentages are recorded from inspired air in positive pressure ventilator? 8

(b) What is artificial kidney? What is the main reason behind using an artificial kidney? Draw a complete schematic layout of hemodialysis machine. How dialysate temperature is controlled in hollow-fiber dialyzer? 8

4(a) What is linear accelerator? Where it is used? Explain its sub-systems with layout diagram. 8

Contd. ...

PURBANCHAL UNIVERSITY
2014

Bachelor in Biomedical Engineering/Seventh Semester/*Final*
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32
BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) Write in brief about blood cell counters. 8

(b) Which instrumental method of analysis gives numerous differential data for normal and pathological values? Explain its function and essential components with complete diagram. 8

2(a) What is blood gas analyzer? Discuss its principles of measurement. How reflectance photometry measures oxygen saturation and Hemoglobin? 6

(b) Explain principle of operation of laser along with its applicative example in biomedical instrumentation system. 10

3(a) What is the principle of surgical diathermy machine? Discuss various types of electro-surgery techniques with suitable examples. What are the most indispensable components used in surgical diathermy machine? Discuss two types of electro-surgical techniques. How stray capacitance can route the leakage currents in diathermy machine? Give the circuit diagram. 10

(b) Write in brief about anesthesia machine and list out its function. 6

4(a) Explain about the working principle of an artificial kidney. 6

(b) What are the differences between artificial ventilator and positive pressure ventilator? Compare their methods of operation. 5

(c) What is lithotripter? Explain about its operation. 5

5. Write short notes on: 4×4=16

(a) Effect of electric current on human body
(b) Spectrophotometery
(c) Need of pacemaker
(d) Infusion Pump and its closed loop control

PURBANCHAL UNIVERSITY
2014

Bachelor in Biomedical Engineering/Seventh Semester/*Final*
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32
BEG4B1BM: Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) Write in brief about blood cell counters. 8

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(b) Explain principle of operation of laser along with its applicative example in biomedical instrumentation system. 10

3(a) What is the principle of surgical diathermy machine? Discuss various types of electro-surgery techniques with suitable examples. What are the most indispensable components used in surgical diathermy machine? Discuss two types of electro-surgical techniques. How stray capacitance can route the leakage currents in diathermy machine? Give the circuit diagram. 10

(b) Write in brief about anesthesia machine and list out its function. 6

4(a) Explain about the working principle of an artificial kidney. 6

(b) What are the differences between artificial ventilator and positive pressure ventilator? Compare their methods of operation. 5

(c) What is lithotripter? Explain about its operation. 5

5. Write short notes on: 4×4=16

(a) Effect of electric current on human body
(b) Spectrophotometery
(c) Need of pacemaker
(d) Infusion Pump and its closed loop control

4(a) Draw a complete schematic diagram of haemodialysis machine. How blood leak is detected? Explain with a circuit diagram. 8

(b) Compare Infusion pump with syringe pump. Describe volumetric infusion pump with a schematic block-diagram. 8

5. Write short notes on any FOUR: 4×4=16

(a) Digital Flame Photometer

(b) Medical Linear Accelerator Machine

(c) Lithotripsy based on piezo-ceramic method

(d) Safety aspects in electro-surgical units

(e) Gas supply and delivery system in Anesthesia machine

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PURBANCHAL UNIVERSITY

2013

Bachelor in Biomedical Engineering/Seventh Semester/*Final*

Time: 03:00 hrs. Full Marks: 80 / Pass Marks: 32

BEG4B1BM, Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) How blood gas analyzer is intended for in vitro diagnostic use by health care professionals? Describe its principle. 6

(b) What are RBC indices? Calculate the RBC indices from the given data: 4

RBC = 5 million/μl, Hb=15g/dl, Hct=45%

(c) How analyte is measured with colorimeter and spectrophotometer? Describe with its useful principle. 6

2(a) What is defibrillator? When DC defibrillator machine is applied to the patient's chest during T-wave of normal cardiac rhythm, there are chances of producing ventricular fibrillation. How would you avoid this problem? 8

(b) What is the best method of cell counting currently used in the lab? 4

(c) Explain electro-surgical unit used in operating theatre with basic principle. 4

3(a) How argon laser beam is transmitted via a quartz fibre wave guide in endoscope set? Explain with suitable diagram. 6

(b) What are the differences between artificial ventilator and positive pressure ventilator? Compare their methods of operation. Arrange an instrumentation system for recording pressure, temperature, and oxygen percentage in inspired air coming from a positive pressure ventilator. 10

Contd. ...

4(a) Draw a complete schematic diagram of haemodialysis machine. How blood leak is detected? Explain with a circuit diagram. 8

(b) Compare Infusion pump with syringe pump. Describe volumetric infusion pump with a schematic block-diagram. 8

5. Write short notes on any FOUR: 4×4=16

(a) Digital Flame Photometer

(b) Medical Linear Accelerator Machine

(c) Lithotripsy based on piezo-ceramic method

(d) Safety aspects in electro-surgical units

(e) Gas supply and delivery system in Anesthesia machine

PURBANCHAL UNIVERSITY
2012

Bachelor in Biomedical Engineering/Seventh Semester/Final

Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32

BEG4B1BM, Biomedical Instrumentation-II

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Missing parameters can be assumed suitably.

Answer ALL questions.

1(a) Draw a neat schematic diagram of a complete blood gas analyzer. How three separate sensors are used for the measurement of pH, PCO_2 and PO_2? Discuss the clinical utility of blood gas analyzer. 10

(b) Explain the principle of colorimetry and spectrophotometry. Discuss how an analyte is measured by these instruments. 6

2(a) What is anesthesia machine? Write down the two main functions of anesthesia machine. Briefly discuss the gas supply and the delivery system. 6

(b) How air and bone conduction is mechanized? Discuss measurement of sound and acoustic considerations. 4

(c) What is high frequency heat therapy? Discuss an ultrasonic therapy unit with necessary diagram. 6

3(a) What is artificial kidney? What are the differences between parallel-plate and hollow fiber dialyzer? How temperature of the dialysate is monitored and controlled at the body temperature before it is given to the dialyzer? Explain with required diagram. 10

(b) What are the applications of LASER in medical field? How argon laser is transmitted into a gastro-intestinal fiber optic endoscope? 6

4(a) Discus the method of operation of artificial and positive pressure ventilators. Explain an instrumentation system of positive pressure ventilator for recording pressure, temperature and oxygen percentage in inspired air. 8

Contd. ...

(b) What is cardiac pacemaker? With complete block-diagram, discuss implantable modern pacemaker 8

5. Write short notes on any FOUR: 4×4=16

(a) Electro-hydraulic based lithotripter

(b) Cardioverter

(c) Nuclear medicine machine

(d) Programmable volumetric infusion pump

(e) Digital-flame photometer