STUDENT EXAM NO. : _____

GANPAT UNIVERSITY

B.TECH SEM. VI BIOMEDICAL & INSTRUMENTATION ENGINEERING

CBCS REGULAR EXAMINATION MAY/JUNE - 2014

2BM601 BIOMEDICAL IMAGING AND RADIOLOGY

TIME : 3 HOURS **TOTAL MARKS: 70**

INSTRUCTION:

1. Write each section in separate answer books.
2. All questions are compulsory.
3. Draw figures and assume data wherever necessary.
4. Conventional terms / notations are used.
5. Figure to the right indicate marks.

Section – I

Que.1 [12]

(a) Explain transverse and axial beam profiles for continuous and pulsed ultrasonic waves. What is near and far field. Show diagrammatically how beam width controls lateral resolution

(b) Draw and explain each block of pulse-echo system in brief. What is swept gain control?

OR

Que.1 [12]

(a) Write the formulas for ultrasonic intensity reflection and transmission coefficient at the tissue interface. An ultrasound beam (US) is reflected at the boundary between two types of body tissues with 4 % intensity reflection coefficient. a) Find the ratio of acoustic impedances of the two tissues. Assume US beam intensity at right angle to the boundary b) if the angle beam is decreased to 60° such that US beam intensity reduces to 0, calculate ratio of US beam velocity in two tissues if ratio of densities of two medium is $\sqrt{3}$: 1.

(b) What is the advantage of Manual scan over Real time B-mode scan? Drawing neat diagrams explain various mechanical and electronic scanners used to produce real time images.

Que.2 [11]

(a) Sketch ultrasonic single crystal transducer showing its different parts. How their thickness depends on US wavelength? What is the importance of jelly?

(b) Explain the working principle of color Doppler flow imaging with block diagram. Write its applications

OR

Que.2 [11]

(a) Derive equation of Doppler shift. Explain pulsed mode Doppler system. Write its advantages and dis-advantages. Give formula to calculate Depth (min) and Depth (max).

(b) Explain attenuation phenomenon of US waves. What is approximate attenuation dependence of frequency for Lungs? Calculate the US wave intensity at heart valve for 2 MHz frequency. US waves traverse through 1cm fat (μ= 0.06 np/cm) and 2cm myocardium (μ= 0.35 np/cm) before reaching heart valve.

Que.3 Write shot note on (Any three) [12]

(a) Duplex Imaging
(b) Echocardiography
(c) Multi-element linear array scanner
(d) Biological effects of Ultrasound

Section – II

Que.4 [12]

(a) What is X-Ray? Enlist the way X-ray photons interact with matter and explain any two type of interaction in detail.

(b) With diagram explain the external structure of X-ray tube.

OR

Que.4 [12]

(a) What do you mean by X-ray quantity and quality? Explain all the factors affecting the X-ray quantity.

(b) Explain the line focus principle and heel effect for X-ray. In concerned with abdominal imaging and chest radiography explain how heel effect is useful.

Que.5 [11]

(a) What is intensifying screen? With diagram explain the intensifying screen in detail.

(b) Explain the conventional radiographic film in brief.

OR

Que.5 [11]

(a) Scattered radiation affects the image contrast? Enlist the name of devices to reduce the scattered radiation and explain one of them.

(b) Write short note on soft tissue radiography.

Que.6 Write shot note on [12]

(a) Explain the generation of White radiation and Characteristic radiation.
(b) Write short note on Digital Radiography.
(c) What is the advantage of having dual focal spots on anode? How these focal spots are useful.

----------END OF PAPER----------

GANPAT UNIVERSITY

B.Tech. Semester VI (BM&I), Regular May-June Examination 2014.

2BM 602 Biopotential and Recorders

Time:- 3 Hours **Marks:- 70**

Instructions:

1. **Answer to the questions must be written in separate answer books.**
2. **Figure to the right indicate marks.**
3. **Assume data, if needed.**
4. **Conventional terms / notations are used.**
5. **All the questions are compulsory.**

SECTION-I

Q.1 **[12]**

(a) Explain the process of propagation of action potential in nerve cells.

(b) Draw the electrical equivalent circuit of a cell membrane with K^+, Na^+ and Cl^- channels. Give the reason for choosing the particular orientation of the battery polarity for each.

OR

Q.1 **[12]**

(a) What is Nernst potential? Derive the Nernst potential for Sodium and Potassium ions. (Assume necessary concentration values for both ions)

(b) In a nerve cell, at the peak of the action potential, P_{Na} is observed to have increased to 450 times its value at rest, P_K not to have changed, and P_{Na}/P_K to be 10. Take $[Na]_o$=120 mM, $[Na]_i$=10 mM, $[K]_o$=5 mM, $[K]_i$=140 mM, temperature to be 27 °C, R=8.31 J/(K-mole), and F=96,500 Coul/mole. What was the resting membrane potential of the cell? What was the membrane potential at the peak of the action potential?

[11]

Q.2

(a) In a cell, on increasing the permeability of an ion, how will the following parameters get affected? a) Membrane potential b) Equilibrium potential of the ion. c) Current carried by the ion. Give reasons for your answers.

(b) Discuss the effect of TTX and TEA on sodium current and potassium current.

OR

[11]

Q.2

(a) Define the factors that determine the rising phase and falling phase of an action potential.

(b) Explain the chemical transmission process occurs at neuromuscular junction.

[12]

Q.3

(a) The resting potential of a cell is determined by 3 ions A^+, B^+ and C^- ions. The equilibrium potential of A^+, B^+ and C^- ions are -30 mV, +30 mV and +90 mV. Given the ration of conductance for A^+ and C^- is equal to 1, what will be the direction of change of membrane potential on doubling B^+ conductance?

(b) Draw and explain the setup of voltage clamp experiment. Also discuss the I-V relationship for sodium channel.

SECTION – II

[12]

Q.4.

(a) Define recorder. Explain different types of recorder and their biomedical applications.

(b) Explain isolation amplifier for ECG.

OR

[12]

Q.4.

(a) Draw and explain direct writing recorder.

(b) Draw and explain block diagram of Electroencephalogram.

Q.5. [11]

(a) Explain Notch filter with neat diagram. Design Notch filter of 60Hz frequency.

(b) Write a short note on effects of artifacts on ECG recording.

OR

Q.5 [11]

(a) Draw and explain Instrumentation amplifier. Also derive gain equation.

(b) Design a wide band pass filter with cut off frequency f_L=100Hz , f_H= 2kHz with pass band gain 10. Also calculate value of figure of merit Q.

Q.6. [12]

(a) Explain narrow band pass filter with neat diagram.

(b) Draw and explain optically coupled isolation amplifier.

(c) What do you mean by filter? Give classification of filters. What are the advantages of active filter over passive filter? Write application of filters.

-----END OF PAPER-----

Student Exam. No._____

Ganpat University

B. Tech. Semester: VIth (Biomedical & Instrumentation) Engineering

Regular Examination May-June 2014

2BM604 Microcontroller Applications

Time: 3 Hours **Total**

Marks-70

Instructions:-

1. All the questions are compulsory.
2. Answer of each section must be written in separate answer books.
3. Figure to the right indicate marks.
4. Assume data, if needed.
5. Conventional terms / notations are used.

Section – I

Que.1 **[12]**

a). Draw and explain block diagram of 8051 micro controller.

b). Explain : 1). CLR C 2). DIV AB 3).RR A
4). RETI 5). XCH A, Byte 6). SUBB A, #34h

OR

Que.1. **[12]**

a). Enlist the ports of microcontroller. Draw the circuit diagram of Port 0 and Port 2 and explain in detail.

b). Write an ALP to do multiplication of two 8bit numbers without using MUL instruction.

Que.2. **[11]**

a). What is PSW? Explain in brief.

b). Discuss various techniques to design delay in 8051.

OR

Que.2 **[11]**

a). Write program to add two 16bit numbers.

b). Write a program to find location of data 12h stored somewhere in the string from 2000H to 2010H.

Que.3. **Answer the following.** **[12]**

1). How many bytes is 24 kilobytes?
2). What does RAM stands for?
3). What is the size of SP register?
4). What do the mnemonics "LCALL" stand for?
5). The 8051 DIP package is a _____pin package.
6). Upon RESET, all the bits of ports are configured as _____
7). Which ports of the 8051 are bit addressable?
8). Why "MOV R2,DPTR" is invalid?
9). What bit addresses are assigned to P2?
10). Give another instruction for "CLR C".
11). What is the default location of stack pointer in 8051?
12). What is the size of ROM in 8051?

Section – II

Que.4. [12]

a). What is serial communication? Explain data framing in 8051 giving example.

b). Explain TMOD. Also discuss the steps to program in mode 1.

OR

Que.4. [12]

a). Write a program to set maximum delay using hardtime delay technique. Also show the calculation.

b). Write an 8051 program to transfer serially "YES" continuously at 4800 baud rate.

Que.5. [11]

a). Explain the function of CALL, JUMP and LOOP instructions. List the different instructions for the same.

b). Explain IE register. Also write the steps in enabling interrupts.

OR

Que.5. [11]

a). Write a program to generate a square wave of 50Hz frequency on pin P1.2. Use interrupt for timer 0. Assume XTAL=11.0592Mhz.

b). Draw the interfacing of stepper motor with 8051. Write the codes for the same.

Que.6. **Answer any three.** [12]

a). Discuss interrupt v/s. polling giving example.

b). Discuss TCON register bits.

c). Draw various configuration of keyboard for interfacing with 8051.

d). Write an ALP to find HCF of given numbers in 8051.

END OF PAPER

Student Seat No._____

GANPAT UNIVERSITY

B.Tech Sem. VIth Biomedical & Instrumentation Engineering

Regular Examination May 2014

2BM603: Diagnostic Techniques & Instrumentation

Time: 3 Hours **Total Marks-70**

Instructions:-

1. All the questions are compulsory.
2. Answer of each section must be written in separate answer books.
3. Figure to the right indicate marks.
4. Assume data, if needed.
5. Conventional terms / notations are used.

SECTION-I

Q-1			(12)
	1	Which measurement is more accurate/appropriate in patients with COPD; spirometry or peak flow?	4
	2	What do the different parameters within spirometry testing mean?	4
	3	Explain in detail Nitrogen washout technique.	4
		OR	
Q-1			(12)
	1	Write short note on N2 analyzers.	6
	2	What are the physiological parameters adaptable to biotelemetry? Explain each of them in detail.	6
Q-2			(11)
	1	What is air conduction and bone conduction?	4
	2	Give the difference between FEV1 and FEV3.	3
	3	What are the advantages and disadvantages of implantable telemetry system?	4
		OR	
Q-2			(11)
	1	Explain pressure differential pneumotachometer.	5
	2	Write short note on opthalmoscope.	6
Q-3			(12)
	1	Describe the blood pressure and PWM telemetry system	6
	2	Write short note on Infrared gas analysers.	6

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SECTION-II

Q-4			(12)
	1	Explain different pulse rate measurement techniques.	6
	2	Explain Modified Fick technique.	6
		OR	
Q-4			(12)
	1	Explain Laser Doppler blood flow meter.	6
	2	Explain dye dilution technique and compare it with thermo dilution method.	6
Q-5			(11)
	1	Explain tocodynamometer with neat diagram and explain how it is better than invasive method.	5
	2	Explain different Displacement Plethysmographies for volume change measurement in limb.	6
		OR	
Q-5			(11)
	1	Explain Doppler ultrasound method for Fetal heart rate measurement method.	5
	2	Explain physiological effects of currents with different magnitudes with comparison diagram.	6
Q-6			(12)
	1	Give difference between NMR flow meter and electromagnetic flow meter.	4
	2	Explain GFCI with neat diagram.	4
	3	Explain arrhythmia detection.	4

----------END OF PAPER----------

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Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester VIth Biomedical & Instrumentation Engineering

CBCS Regular Examination May 2014

2BM605: Bioinformatics

Time: 3 Hours **Total Marks: 70**

Instructions:

1. **Answer to the question of section must be written in separate answer books.**
2. **Figure to the right indicates marks.**
3. **Conventional terms / notations are used.**
4. **All the questions are compulsory.**

Section - I

Que. – 1	(1)	Define DNA Translation. Explain entire process of DNA translation with neat diagram.	06
	(2)	What is nucleotide? Draw single nucleotide of DNA.Draw and Explain different nitrogen bases of DNA.	06
		OR	
Que. – 1	(1)	Define Prokaryotes. Explain DNA Transcription in Prokaryotes.	05
	(2)	What is DNA? Explain structure of DNA with neat diagram.	07
Que. – 2	(1)	Find the local alignment for the following sequences: ATTCGATCC and ACGAT. Use match score =1, mismatch score=0, gap penalty= -	06
	(2)	Explain different types of RNA with neat diagram.	05
		OR	
Que. – 2	(1)	What is cloning? Explain Cell based DNA cloning with neat diagram.	07
	(2)	Explain Peptide bond and Phosphodiester bond with its chemical structure.	04
Que. – 3	(1)	Explain basic structure of Amino acid. Explain primary and secondary structures of protein in detail.	07
	(2)	What is Mutation? How do Mutations occur? Explain point and Frame shift mutations with examples of each.	05

Section – II

Que. – 4	(1)	Write a Perl program to print out the contents of file in alphabetical order if and only if the third line of the file is 'This is DNA' and the last line of the file is 'This is RNA'.	05
	(2)	Explain grep, cut, cmp commands used in Linux with example.	04
	(3)	Write a Perl program that checks whether the number of nucleotides in a given sequence is even or odd.	03

OR

Que. – 4	(1)	What is PERL? What are the types of variables used in Perl? Give one example of each	05
	(2)	Write a Perl program to search any given motif in a particular sequence read from a file.	04
	(3)	Write a subroutine that checks for any blank line in a file and displays the message if there is one. If there are blank lines in the file, remove them and print out the data.	03
Que. – 5	(1)	Write a Perl program that checks if two strings given as arguments are reverse complements of each other or not. If they are not, find out the reverse complements of both sequences.	06
	(2)	Write a PERL program to determine the percentage of each nucleotide occurring in sequences read from a file.	05

OR

Que. – 5	(1)	Define array variable. How splice function can be used to add or delete an element from the array? What is the use of split function in PERL? Explain with example.	06
	(2)	What is the significance of the regular expressions in PERL? Explain different regular expressions in detail.	05
Que. – 6	(1)	Define flow control of a program. Explain types of loops in PERL. Explain flow control in PERL using loops with example of each.	06
	(2)	Write a short note in LINUX operating system. Explain wild cards in Linux with example.	03
	(3)	Write a Perl program to read the data from two files and print the data in such a way that lines of both files are printed alternately i.e. first line from one file and second line from another file and so on.	03

END OF PAPER

Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VI (Biomedical & Instrumentation) Engineering

CBCS Regular Examination May/June 2014

2BM606 Hospital Management & Information System

Time: 3 Hours **Total Marks: 70**

Instruction: 1 Write each section in separate answer book.
2Answer should be brief and to the point.
3 Figure to the right indicates marks.
4 Assume suitable data, if necessary.

SECTION – I

Que. – 1 **12**

(a) Give the classification of healthcare organization. Explain one of the classifications in detail.

(b) Why proper orientation of hospital building is necessary? Explain the artificial ventilation.

OR

Que. – 1 **12**

(a) Enlist and explain in detail the factors influencing hospital utilization.

(b) Why hospital planning team is required? Explain this statement in detail.

Que. – 2 (a) **11**

For the following data from WHO calculate the **i)** Admission/year (direct & indirect population) **ii)** total admission/year **iii)** total bed days/year **iv)** total bed days /year with 100% occupancy.

i) Direct & indirect populations: 6,00,000 & 8,00,000
ii) Admission/year/1000 population: Direct population: 165 by WHO
iii) Admission/year/1000 population: Indirect population: 55 as per WHO
iv) Average length of stay in days: 10

(b) Who is hospital consultant? Enlist the type of guidance provided by him in hospital planning.

OR

Que. – 2 **11**

(a) Explain the power requirement and its utilities for hospital

(b) Who are the prime members of hospital planning team? Explain their responsibilities for hospital planning.

Que. – 3 **12**

(a) Define "health care waste" and classify it.

(b) Explain the Indian Standard Codes for ward lighting.

(c) Enlist the equipment for a tertiary unit.

SECTION – II

Que. – 4 12

(a) Define Outpatient? Which are the sources of origin for outpatient? Draw the flow chart of outpatient department and explain in detail.

(b) Draw & explain the H shaped, E shaped, T shaped, Box plan and Cross type floor plans for ward floors.

OR

Que. – 4 12

(a) Explain the cumulative input and output system at the waiting room of outpatient department of a public hospital.

(b) Define "Ward". Explain Nightingale Ward.

Que. – 5 11

(a) Draw & explain the different layouts for radiology department.

(b) Define following terms:

1) Hospital bed,
2) Bed Complement,
3) Admission,
4) Discharge,
5) Hospital Death.

OR

Que. – 5 11

(a) Draw the OT suite circulation pattern & explain in detail.

(b) Which are the basic ethical principles in critical care medicine? Explain.

Que. – 6 12

(a) Write the full form of the following:
OICU, MICU, SICU, BICU, NICU, PICU

(b) Calculate the requirement of consulting cum examination room for the following data:

Direct Population	:	2,00,000
Indirect Population	:	50,000
Consulting per person per year (Direct)	:	3
Consulting per person per year (Indirect)	:	0.5
Average first consultations	:	30 %
Average subsequent consultations	:	70 %
Time taken for first consultation	:	20 minutes
Time taken for subsequent consultation	:	10 minutes
Scheduled hours of OPD	:	7 hours

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