

Khushi  
23

Course Code : IDT 353

MQNR/RS-23/1026

Sixth Semester B. Tech. (Electronics and Communication  
Engineering / Electrical Engineering) Examination

BIOLOGY FOR ENGINEERS

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) Solve all questions.
- (2) Draw suitable diagrams wherever necessary.

1. What is Biomimicry or Bionics ? Explain with the case study.

OR

Discuss the term Physiology. Explain the Human Digestive System in detail. 10(CO1)

2. Explain the term Biomolecules. Discuss the Carbohydrates in details.

OR

Explain the term Biomolecules. Discuss the Nucleic Acids in details. 10(CO2)

3. Illustrate the concept of Metabolism. Also explain the fundamental principles of Energy Transactions as applied to biology. 10(CO3)

4. Discuss the term Genetics. Also discuss the Expression and Transmission of Genetic Information in detail.

OR

Discuss the term Genetic Codes. Also discuss the Concept of DNA Cloning in detail. 10(CO4)

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5. Explain the term Bioelectric Signals. Explain the term ECG in details. 10(CO5)
- 6. Explain the term Medical Imaging. Explain in detail about MRI. 10(CO5)





Course Code : ECT 359-3

MQNR/RS-23/1029

Sixth Semester B. Tech. (Electronics and Communication Engineering)  
Examination

BIOMEDICAL ELECTRONICS

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) Draw neat and clean diagrams, wherever necessary.
- (3) Assume suitable data wherever necessary.

1. (A) Describe the various origins of bioelectric signals. Draw a typical cell potential waveform, label it properly and explain the phenomena of depolarization and repolarization. 5(CO1,2)
- (B) List the any five human physiological systems. Elaborate the working of human heart with respect to cardiovascular (circulatory) system. 5(CO1)
2. (A) Summarize and elaborate the various types of electrodes used in bio-potential measurement with their applications. 5(CO2)
- (B) What do you mean by transducer ? List out the different types of transducer used in measurement of temperature in medical field. Explain the principle of thermocouple. What is the most common thermocouple used for body temperature measurement ? *thermistors* 5(CO2)
3. (A) Elaborate on the differences between ECG, EEG, EMG and ERG Bioelectric signals with respect to their primary signal characteristics (frequency and amplitude ranges) types of electrode used in them and their applications medical diagnosis. 5(CO1,2)
- (B) What do you mean by bio-telemetry ? Which type of modulation system is used in a multichannel bio telemetry system ? Draw and briefly elaborate the single channel telemetry system suitable for transmission of an ECG. *FDM* 5(CO1,4)

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4. (A) What is the principle of working of 'Pulse Oximeter' ? What type of transducer is used for pulse oximetry ? Explain the signal processing arrangement in a Pulse Oximeter. 5(CO3)
- (B) Describe the various scanning techniques used in computed tomography. Explain how the progressive developments in scanning techniques have helped to reduce the scanning time. 5(CO3)
5. (A) What are the general parameters monitored by Bedside Monitors ? Explain the generalized block diagram of a typical bedside monitor. 5(CO4)
- (B) What is the need of 'Ambulatory Monitoring Systems' ? Explain the sub-systems for data recording and analysis in an ambulatory monitoring system with an example. 5(CO4)
6. (i) Distinguish between gross shock and micro current shock. Briefly elaborate an effect of various levels of current on the human body.
- (ii) Draw the relationship between frequency and maximum permissible leakage currents through :
- (a) The body and
- (b) The heart and explain. 10(CO5)





Course Code : CST 364

MQNR/RS-23/1025

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Sixth Semester B. Tech. (Electronics and Communication Engineering) Examination

OBJECT ORIENTED DATA STRUCTURE

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) Assume suitable data wherever required and mention it.

1. (a) (1) What is wrong with each of the following commands ?  
Javac Example.class  
Java Example.class
- (2) Does it matter where on a line you put a statement in java ?  
2(CO1) 2
- (b) What do you mean by Typecasting in java ? Explain types of it with example.  
4(CO1) 1
- (c) The sum of first n natural numbers is given by :  $sum = n(n+1)/2$ . Write a java program to print the sum of first n natural numbers.  
4(CO1) 1
2. (a) Write a java program for binary search, numbers to be entered by command line.  
4(CO2) 1
- (b) Create a **Person** class with private instance variable for the person's name and birth date. Add appropriate accessor methods for these variables. Then create a subclass **CollegeGraduate** with private instance variable for the students' GPA and year of graduation and appropriate assessors for these variables. Add appropriate constructors for your classes. Then create a class **System** with a main method that demonstrate your classes.  
4(CO2) 3
- (c) Is there any difference between parameterized constructor and overloaded constructor ?  
2(CO2) 2

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3. (a) What do you mean by compile time polymorphism ? How it is different than run time polymorphism ? 5(CO2) 3

(b) Create a user defined package name homebudget which contains home expenditure and Home income class. For both the classes find a suitable data member and its functionality. Define another class where you have to import home budget package and find out the total savings of your family. 5(CO2) 3

4. (a) Prove that running Time (any Three) :—

(i)  $T(n) = n^3 + 50n$  is  $\Omega(n^2)$

(ii)  $T(n) = n^3 + 25n + 5$  is  $O(n^4)$

(iii)  $T(n) = n^3 + 20n + 3$  is not  $O(n^2)$

(iv)  $T(n) = n^4 + 20n^2 + 6$  is  $\Omega(n^3)$

Using suitable examples.

6(CO3) 4

(b) Find the complexity for the given code and elaborate.

<p>(i)</p> <pre>k=0 For (i = 0 ; k &lt; n ; i++) { k = k + i; }</pre> <p style="text-align: right;"><i>O(n^2)</i></p>	<p>(ii)</p> <pre>for (i = n ; i &gt; 0 ; i--) { for (j = 1 ; j &lt; n ; j * 2) { cout &lt;&lt; i; } }</pre> <p style="text-align: right;"><i>O(n^2)</i></p>
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4(CO3) 2

5. (a) Write a program in JAVA to implement circular queue. Interface should have three methods for inserting, Deleting and displaying the items in circular queue.

OR

Write a program in JAVA to implement stacks operation. Interface should have methods for Push and Pop operation. 5(CO4)



- (b) What is the value of the postfix expression 6 3 2 4 \* 11 40 ?  
Evaluate the above expression using stack operation. Also write an algorithm for the same. (Infix to postfix) 5(CO4)

6. (a) Write an algorithm to find particular element from a singly linked list. What will be the time complexity of this operation ? 5(CO4)

- (b) Which are the advantages of Doubly linked list over simple linked list ? Write a java method to add an element in the middle of doubly linked list. 5(CO4)



$$\begin{array}{r} 4 \\ \hline 2 \\ \hline 3 \\ \hline 6 \end{array} \quad \begin{array}{l} ] 8 \\ ) \\ \hline 5 \\ \hline 6 \end{array}$$



Course Code : ECT 357

MQNR/RS-23/1024

Sixth Semester B. Tech. (Electronics and Communication Engineering)  
Examination

COMPUTER NETWORKS

Time : 3 Hours ]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (A) What are some of the factors that determine whether a communication system is a LAN or WAN ? 5(CO1)  
✓  
(B) What are headers and trailers and analyze how do they get added and removed ? 5(CO1)
2. (A) Compare and contrast a circuit-switched network and a packet-switched network. 5(CO3)  
✓  
(B) List three categories of Multiple Access Protocols. Discuss any one protocol in details. 5(CO3)
3. (A) In a stop-and-wait ARQ system, the bandwidth of the line is 1 Mbps, and 1 bit takes 20 ms to make a round trip. What is the bandwidth-delay product ? If the system data frames are 1000 bits in length, there is the underutilization of the link ? Justify. 5(CO4)  
•  
(B) Discuss the relationship between STS and STM. What are the user data rates of STS-3, STS-9 and STS-12 ? Show how STS-9's can be multiplexed to create an STS-36. Is there any extra overhead involved in this type of multiplexing. 5(CO4)
4. (A) Explain Dijkstra Algorithm and also discuss the scenario where Dijkstra algorithm may not work. 5(CO3)  
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- 4 (B) Design a network for an organization which is granted with the block of IP address 16-0-0-0/8. The administrator wants to create 500 fixed-length subnets.
- (a) Find the subnet mask. 123 (111)
  - (b) Find the number of addresses in each subnet.
  - (c) Find the first and last addresses in subnet 1.
  - (d) Find the first and last addresses in subnet 500. 5(CO5)
5. (A) Compare the TCP header and the UDP header. List the fields in the TCP header that are missing from UDP header. Give the reason for their absence. 5(CO4)
- (B) What does HTTP stand for and what is its function? How is HTTP related to WWW? 5(CO2)
6. (A) Explain Symmetric-Key Cryptography. Using Caesar ciphering with key=15, encrypt the message "HELLO". 3 lett 5(CO2)
- (B) For a RSA algorithm with  $p=3$  and  $q=11$ , evaluate public key and private key. Also obtain the ciphertext for the plaintext 'HELLO'. 5(CO2)





Course Code : ECT 356

MQNR/RS-23/1023

Sixth Semester B. Tech. (Electronics and Communication  
Engineering) Examination

COMPUTER ARCHITECTURE

Time : 3 Hours ]

[Max. Marks : 60

Instructions to Candidates :—

- (1) Assume suitable data wherever necessary.
- (2) All questions are compulsory.
- (3) Neat sketches and block diagrams are expected wherever necessary.

1. (a) Implement the given functions using PAL and PLA :  
 $f_1(a, b, c, d) = \pi M(1, 2, 3, 8, 12, 14, 15) \cdot d(0, 7, 10, 13)$   
 $f_2(a, b, c, d) = \Sigma m(1, 5, 7, 8, 9, 10, 11, 12, 14).$  10(CO4)
2. (a) Perform Booth Multiplication algorithm on  $(-25)_{10}$  and  $(41)_{10}$ . 5(CO2)  
(b) Convert the given numbers into IEEE 754 single precision floating point binary representation :  
(i)  $(-210.25)_8$   
(ii)  $(1C23.F1)_{16}$  5(CO3)
3. Design Control unit for Full adder in a Computer system using Delay Element Method and State Table Method. 10(CO5)
4. (a) Describe Priority Control Function in a Bus Control Unit. 5(CO1)  
(b) Perform division on  $(50)_{10}$  by  $(3)_{10}$  using restoring algorithm. 5(CO2)

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5. (a) Consider a paging system in which main memory has the capacity of three pages. The execution of a program Q requires reference to five distinct pages  $P_i$  where  $i=1, 2, 3, 4, 5$  and  $i$  is the page address. The page stream formed by executing Q is :

2 3 1 1 5 1 4 4 3 2 5 2

Assess how pages are assigned to main memory using FIFO, LRU and OPT replacement policies. 5(CO3)

- (b) Discuss Flynn's classification of parallelism in a computer system. 5(CO1)

6. (a) Analyze internal organization of CPU with cache memory. 5(CO1)
- (b) Discuss locality of reference with respect to virtual memories along with diagram. 5(CO1)

