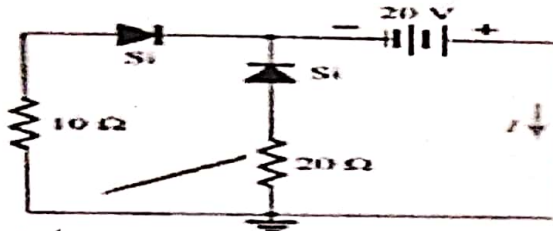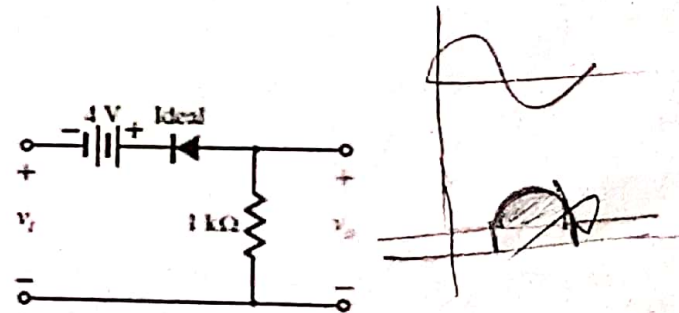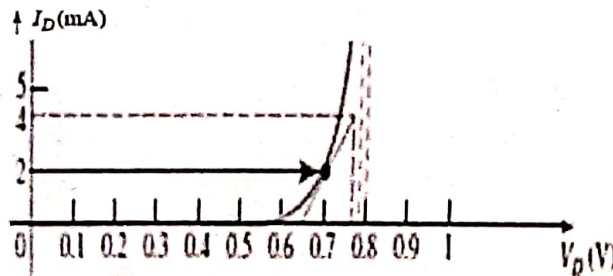1. You are given the values 1, 2, 3, 4, 5, 6, 7. Insert them one by one in a max heap and show the heap after each insertion.    20

2. Assume you are making a heap using linked list. Write a class/structure for heap with insert and extract_max functions.    20

3. Given the preorder traversal of a max-heap as an integer array, write a algorithm that can reconstruct the tree. You may assume that you already have a heap structure with insert and extract_max functions available at your disposal.    10

4. You are given an array A of N integers. You are also given Q queries. Each of the query contains two integers X, Y. For each query, you need to find the median of the sub-array starting at index X and ending at index Y.    10

5. You are given a sorted array with N integers. Using binary search find out how many integers in the given array is positive.    20

6. You are given three arrays A, B and C. All three of them contains integers in sorted order. Write an algorithm to make a combined sorted array from A, B and C.    10

7. Given an array containing positive integers, print the Closest Lesser Element (CLE) for every element. The CLE for an element X is the closest lesser element on the left side of X in the array. Elements for which no lesser element exist, consider CLE as -1.    10
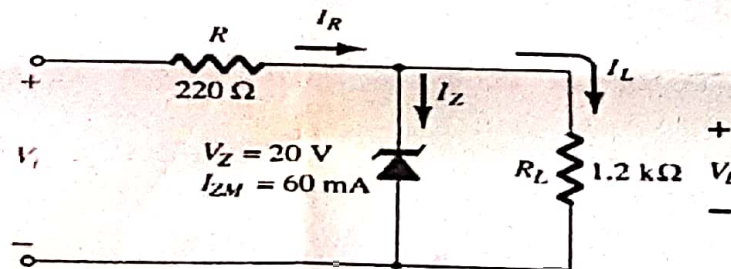
$2J5$ mins

1(a) Explain with figure how minority and majority carriers are produced in semiconductor.

(b) Calculate $I$ in the following circuit. Consider practical Si diode.



2(a) Prove that dynamic resistance, $r_d = \frac{26mV}{I_D}$. Use this equation to determine the dynamic resistance at a forward voltage of 0.7 volt in the following figure (lefthand).

(b) Draw the input and output wave form of the following (right hand) circuit when a sinusoidal input voltage of 10 V amplitude is applied.



3(a) Draw a basic voltage regulator circuit using Zener diode and determine $V_L$, $I_L$, $I_Z$, and $I_R$ assuming $V_S = 20V$, $R_S = 230\ \Omega$, $R_L = 470\ \Omega$ and $V_Z = 10V$.

(b) Determine the range of values of $V_i$ that will maintain the Zener diode of Fig. below in the "on" state.

UNIVERSITY OF DHAKA
The Department of Computer Science and Engineering
Bachelor of Science in Computer Science and Engineering [Year-2: Semester-1]
Subject code and Title: **GED-2104- Bangladesh Studies**
**In course Examination 2020**; Marks: 30 Marks

*Instruction: This question paper is divided in to three parts and it is required to answer from all three parts as instructed. Part A contains creative questions, Part-B consists short answer and part c comprises short notes. The marks for questions are shown in brackets.*

### Part-A: Creative Question [Answer any one, 1X10 =10]

**1)** **Read the stem and answer the questions below**

The University of Dhaka owes its origin to several factors: first and foremost, the desire of the Mussalmans of Eastern Bengal to stimulate the educational progress of their community; secondly, the desire of the government of India to create a new type of residential and teaching University in India, as opposed to the present affiliating type. The third factor of special importance was the desire of the Government to relieve the congestion of the University of Calcutta. "The chief determining factor in the decision of the Government to make Dacca the seat of a University", according to the Calcutta University Commission of 1917, "was doubtless, the desire to accede to the demand for further facilities for the Muslim population who form a vast majority in Eastern Bengal."
(Calcutta University Commission Report 1917)

**Question**

  a) What was the main reason for establishing University of Dhaka? (2)
  b) *'Establishment of Dhaka University was the most significant event of British Colonial Era in Bengal'* – To what extent do you agree? Explain with arguments and related examples. (3)
  c) *One of the underneath cause of setting up University of Dhaka was to stimulate the educational progress of the community of Eastern Bengal-* Evaluate the role of Dhaka University in stimulating educational progress in Bangladesh since inception? (5)

**2)** **Look in detail to this extract, and answer the following questions.**

Twenty-five years ago [during British rule], a wedding was being solemnized in a Bengali Zemindar's house. The house was full of guests. It was very late. Everyone in the house was sleeping except for a few burglars who planned to rob the house. One of the burglars entered the house by digging a tunnel through the mud wall of one room. One of the night guards suspected something amiss and woke the head of the house. The Zemindar and five of his brothers armed themselves quietly and started to look for the burglar. They were all upset and angry at the audacity of this burglar. The thief, in the meantime, had entered one of the big bedrooms where several guests were sleeping. As soon as they saw a stranger entering the room, the women dived deep under the bedclothes and held their breath. The thief broke the wall safe and took everything he wanted. When he approached one Begum and asked for her

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jewelry, the rest of them hurriedly started taking off their jewelry to offer it quietly to the thief. The thief, noticing this, decided to wait patiently till this was accomplished. Unfortunately, there was a new bride in the group who, though able to take off her huge nose ring, was unable to take off her heavy earrings, all entangled in her hair. The thief, after a polite wait, became impatient. He took out his sharp knife and after severing the ears of the bride beat a hasty retreat [*source: Rokeya Sakhawat Hossain's The Secluded Ones*]

**Question**

a) Identify two commonly held societal attitudinal ideas towards women during the colonial periods. (2)

b) 'The greatest social stumbling block between the British and the Indians was purdah originated from Muslim conservativeness"—explain the statements. (3)

c) The entire plot of 'the above passage' hinges on women backwardness that accelerated by men for keeping their dominance in the colonial social system of Bangladesh. Do you agree? Answer with suitable contextual analysis and relevant arguments. (5)

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## Part –B: Short Essay [Answer any one, 1X10=10]

3) a) What is the Battle of Plassey? What were the Causes of the Battle of Plassey? (2+2)
b) Analyses the after-effect of the decisive *British East India Company* victory over the Nawab of Bengal and his French allies in the Battle of Plassey? (6)

4) a) What was the initial goal of western education in India as introduced by the East India Company? Mention few contributions of the East India Company in the context of educational development in Bengal? (2+2)
b) How the educational reformations during British rule in Bengal promoted the forces of unity and division in the society? Discuss elaborately with specific examples? (6)

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## Part –C: Short Notes [Answer any two, 2X5=10]

5) Write Short notes about the contributions of the following native heroes (2X5=10)

a) Master Da Surya Sen      d) Raja Ram Mohan Roy

b) Haji Shariatullah      e) Hajee Mohammad Danesh

c) Syed Mir Nisar Ali Titumir      f) Pritilata Waddedar