Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science & Engineering Department

1st Year 2nd Semester B.Sc. Engineering Examination-2021

Course No: BST 155 **Course Title: Bangabandhu in Science and Technology**
Full Marks: 60 **Time: 3 hours:**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

SECTION-A (30 Marks)

Q.1	(a)	What do you know about the childhood and educational background of Bangabandhu Sheikh Mujibur Rahman?	10
	(b)	Why Bangabandhu is called the Father of the Nation?	
	(c)	Evaluate the contributions of Bangabandhu Sheikh Mujibur Rahman in the emergence of Bangladesh.	
Q.2	(a)	What do you know about the background and causes of language movement?	5
	(b)	Assess the role of language movement in developing Bengali nationalism.	5
Q.3	(a)	Make a comparative analysis regarding the election manifesto of the United Front and Muslim League in 1954's General Election and point out the causes behind the victory of United Front in this election.	10
Q.4	(a)	'The seed of independence of Bangladesh lied in the Six Point Program'- Explain.	10

SECTION-B(30 Marks)

Q.5	(a)	Write a short note on Agartala Conspiracy Case.	3
	(b)	Describe the result and significance of the General Election in 1970	7
Q.6	(a)	Evaluate the socio-economic initiatives of Bangabandhu Sheikh Mujibur Rahman to rebuild the war torn nation.	6
	(b)	What kind of challenges did he face while undertaking these initiatives?	4
Q.7	(a)	Review the significance of 7th March Speech.	5
	(b)	Describe the political philosophy of Bangabandhu	5
Q.8	(a)	What do you mean by Foreign Policy?	3
	(b)	Review the foreign policy of Bangabandhu after liberation war.	7

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Department of Computer Science and Engineering
1st Year 2nd Semester B.Sc. Engineering Examination-2021

Course No: CSE153 **Course Title:** Discrete Computational Theory
Full Marks: 60 **Time:** 3 hours

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All parts (a, b, c, ...) of a question must be answered sequentially.

SECTION – A (30 Marks)

1. a) Define the power set. Determine the power set Power(A) of A = {a,b,c,d} 3
   b) Among 50 students in a class, 26 got an A+ in the first examination, and 21 got an A+ in the second examination. If 17 students did not get an A+ in either examination, how many students got an A+ in both examinations? Draw the Venn diagram also. 4
   c) Briefly explain the symmetrical difference with an example. 3

2. a) What are the limitations of the propositional logic? Explain it with proper examples. 2
   b) What do you mean by predicates and different types of quantifiers? 4
   c) Express the statement "Every student in this class has taken a course in calculus" using predicates and quantifiers. Also negate the quantified expression and re-write it as an English sentence. 2+2

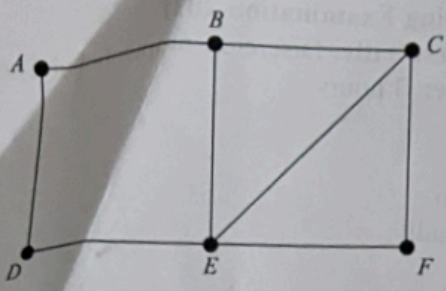
3. a) Determine which of the following sets are finite, countably infinite and uncountably infinite and why? 3
      (i) Set of all even numbers
      (ii) Set of all fish in Pacific Ocean
      (iii)Set of all real numbers between 0 and 1
   b) Define partitions of a set. Consider the following collections of subsets of S = {1, 2, …, 8, 9}. Find which of followings are a partition of S: 1+3
      (i) [{1, 3, 5}, {2, 6}, {4, 8, 9}]
      (ii) [{1, 3, 5}, {2, 4, 6, 8}, {5, 7, 9}]
      (iii)[{1, 3, 5}, {2, 4, 6, 8}, {7, 9}]
   c) Given A = {1, 2, 3, 4} and B = {x, y, z}. Let R be the following relation from A to B: 3
      R = {(1, y), (1, z), (3, y), (4, x), (4, z)}
      (i) Determine the domain and range of R.
      (ii) Draw its directed graph.
      (iii)Find the inverse relation R^{-1} of R.

4. a) What is the relationship between the Cartesian product of two sets and a relation? 1
   b) Let A = {1, 2, 3}, B = {a, b, c}, and C = {x, y, z}. Consider the following relations R and S from A to B and from B to C, respectively. 1+4
      R= {(1, b), (2, a), (2, c)} and S= {(a, y), (b, x), (c, y), (c, z)}
      i. Find the composition relation $R \circ S$
      ii. Find the matrices M_R, M_S, and $M_{R \circ S}$. Compare $M_{R \circ S}$ to the product $M_R M_S$.
   c) Consider the following relation R on the set A = {1, 2, 3, 4}: 4
      R = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}
      Check whether R is a reflexive, symmetric, antisymmetric, or transitive relation.

SECTION-B (30 Marks)

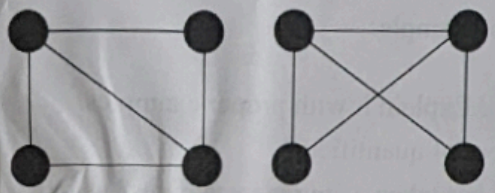
5. a) Consider A = {a, b, c, d} and B = {1, 2, 3} and the function f: A → B with $f(a) = 3$, $f(b) = 2$, $f(c) = 1$ and $f(d) = 3$. Examine whether the function f is to be one-to-one, onto or one-to-one correspondence. 4
   b) Let V = {1, 2, 3, 4}. For the following functions f = {(1, 3), (2, 1), (3, 4), (4, 3)} and g = {(1, 2), (2, 3), (3, 1), (4, 1)} where f: V → V and g: V → V, find: (i) $f \circ g$ and (ii) $g \circ f$ 4
   c) Let f: **R** → **R** be defined by $f(x) = 3x - 7$. Find a formula for the inverse function f^{-1}: **R** → **R**. 2

6. a) Define simple graph and multigraph with examples. 2
   b) Consider the following connected graph G. Check whether the graph G has a Euler path, a Euler circuit or a Hamiltonian circuit. 3

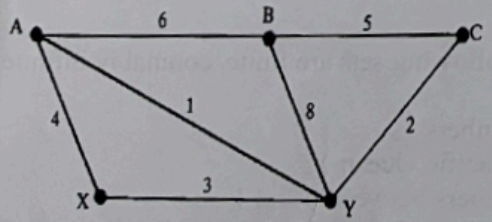


c) Let G be the graph in 6(b). 5
Find: (i) All simple paths from A to F (ii) All cycles which include vertex A (iii) d(A, F), the distance from A to F (iv) diam(G), the diameter of G and (v) any cut points

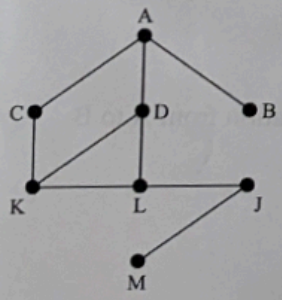
7. a) In this following example, show whether the following graphs G1 and G2 are isomorphic or not. 2



b) Find a minimal spanning tree of the following weighted graph using Prim's algorithm. 4



c) Find the order of vertices of the following graph G are processed using BFS algorithm starting at vertex A. Show the processing steps. 4



8. a) What is a complete binary tree? Give a figure. 1

b) Define the binary search tree. How will you insert a data item into a binary search tree? 2

c) What is a heap? Discuss different types of heaps. 3

d) Suppose the preorder and inorder traversals of a binary tree T yield the following sequence of nodes: 4
Preorder: G,B,Q,A,C,K,F,P,D,E,R,H
Inorder: Q,B,K,C,F,A,G,P,E,D,H,R

i. Draw the diagram of T.
ii. Find the depth d of T.
iii. List the terminal nodes of T.

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1st Year 2nd Semester B. Sc. Engineering Examination-2021

Course Title: Object Oriented Programming **Course Code: CSE 151**
Full Marks: 60 **Time: 3(Three) Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.

Section A

Q.1	(a)	State the important features of object oriented programming.	2
	(b)	Briefly describe Encapsulation, Polymorphism, and Inheritance with real life example.	4
	(c)	C++ program to create student class, read and print N student's details using array of objects.	4
Q.2	(a)	Distinguish between Cin and Cout in C++ with example.	2
	(b)	Differentiate public, private and protected members in C++ with example.	4
	(c)	Write a program to clearly explain the difference between parameterized constructor and constructor with default arguments.	4
Q.3	(a)	What is constructor and destructor? When they are execute? Explain with example.	2
	(b)	Create a class called **triangle** the find the **area** of triangle from base and height. You have to use parameterized constructor to set the value of **base** and **height**.	4
	(c)	What are the different access specifiers used in C++? Give the properties of each one of them.	4
Q.4	(a)	What is a friend function? Explain the need for using a friend function.	2
	(b)	What is copy constructor? Explain with example.	3
	(c)	Write a program to make a function "Account()" that can access the private data members of two different classes "Employee" and "Student" using the concept of friend function.	5

Section B

Q.5	(a)	Write down the differences between early and late binding.	2
	(b)	Write short description on Multiple Inheritance and diamond problem in C++ with proper example.	4
	(c)	Design three class student, test and results where result is inherited from test and test is inherited from student. Write possible functions to initialize the values. Write main function for execution by creating objects.	4
Q.6	(a)	What is inheritance? Why and when to use inheritance? Write a program in C++ to demonstrate this.	1+4
	(b)	Compare and contrast different types of inheritance in C++.	3
	(c)	When do we declare a member of a class static?	2
Q.7	(a)	Define polymorphism? Explain function overloading and operator overloading.	1+3
	(b)	What are virtual functions? Give an example of virtual functions with a standalone C++ program.	1+3
	(c)	Distinguish between virtual functions and pure virtual functions.	2
Q.8	(a)	Define Exception handling. Briefly describe the exception handling mechanism with example.	4
	(b)	What is a scope resolution operator? Why is it used in C++?	2
	(c)	What is Operator overloading? Explain with an example?	4

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1st Year 2nd Semester B.Sc. Engineering Examination-2021

Course Title: Electronic Devices and Circuits **Full Marks:** 60

Course No: EEE155 **Time:** 03 Hours

N.B.

i) Answer **six (06)** questions.

ii) All questions are of equal values.

iii) The figures in the right margin indicate full marks for each question.

SECTION-A (30 Marks)

Q.1 (a) Define shallow and deep level doing, discuss its effect on conducting properties of a semiconductor. 5

(b) Classify solids in terms of energy bands. 5

Q.2 (a) Define electron emission. Explain photoelectric emission. 5

(b) Explain Zener diode as a voltage regulator. 5

Q.3 (a) What is rectification? Compare between full wave bridge and center tapped full wave rectifier with proper sketch. 4

(b) Draw and explain the working principle of a Clamper circuit. 4

(c) What is peak inverse voltage? 2

Q.4 Write short notes on:

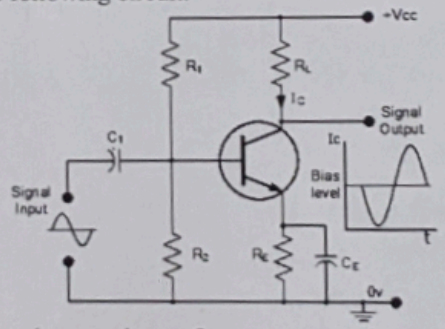
(a) Varactor diode 5

(b) Photodiode 5

SECTION-B (30 Marks)

Q.5 (a) How a PN junction diode is working? Draw and explain V-I characteristics of PN diode with neat diagrams. Show the effect of temperature on its V-I characteristics. 4

(b) Discuss the operation of the following circuit. 4



(c) Define cutoff and saturation region of a common base transistor amplifier with appropriate figure. 2

Q.6 (a) Define Intrinsic and Extrinsic Semiconductors 3

(b) Draw the circuit diagram for full-wave rectifier and explain its working. 4

(c) Compare between BJT and FET. 3

Q.7 (a) Discuss the working principle of High precision rectifie. 4

(b) Draw the common emitter circuit and sketch the input and output characteristics. Also explain active region, cutoff region and saturation region by indicating them on the characteristic curve. 4

(c) What do you understand by pinch off voltage ? Why FET is called as "voltage operated device"? 2

Q.8 (a) Compare BJT and MOSFET. Sketch the ohmic region in drain characteristics of JFET? 2

(b) Draw and explain the characteristics of n-channel Enhancement MOSFET

(c) Write short note on CMOS

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Course No.: MAT155 Course Title: Co-ordinate Geometry & Ordinary Differential Equation
Full Marks: 60 Time: 03 Hours

[N.B. Answer any **SIX** questions taking **THREE** of each section.]

SECTION-A

1. (a) To find the condition that the general equation of 2nd degree $ax^2+2hxy+by^2+2gx=2fy+c=0$ represent a pair of straight lines. 7

   (b) Show that, the equation $3x^2-14xy-5y^2-54x-2y+51=0$ represent s a pair of straight lines. Also find their point of intersection and the angle between them. 3

2. (a) Show that, the equation $ax^2+2hxy+by^2+2gx=2fy+c=0$ represent two parallel lines if $\frac{a}{h}=\frac{h}{b}=\frac{g}{f}$ 4

   (b) If θ be the angle between the straight lines which are represented by the general equation of 2nd degree $ax^2+2hxy+by^2+2gx=2fy+c=0$ then show that, $\tan\theta=\frac{2\sqrt{h^2-ab}}{a+b}$ 6

3. (a) Define direction cosine. Find the angle between the line whose direction cosines are (l_1,m_1,n_1) and (l_2,m_2,n_2) 4

   (b) Prove that, the general equation of 1st degree represent a plane. 3

   (c) Show that, the points $(0,-1,-1),(4,5,1),(3,9,4)$ and $(-4,4,4)$ are coplanar. 3

4. (a) Find the condition that one line in symmetrical form and another in general form are intersected. 4

   (b) A sphere of constant radius k passes through the origin and meets the axes in A,B,C. Prove that, the centroid of the triangle ABC lies on the sphere is $9(x^2+y^2+z^2)=4k^2$ 3

   (c) Prove that, the projection of segment joining the two points $P(x_1,y_1,z_1)$ & $Q(x_2,y_2,z_2)$ on a line with direction cosines l,m,n is $(x_2-x_1)l+(y_2-y_1)m+(z_2-z_1)n$ 3

SECTION-B

5. (a) Define partial differential equation. Find the differential equation of circle with radius a. 4

   (b) Show that, the differential form of $Ax^2+By^2=1$ is $x\left[y\frac{d^2y}{dx^2}+\left(c\right)^2\right]=y\frac{dy}{dx}$ 3

   (c) Solve: $x\sqrt{1-y^2}\,dx+y\sqrt{1-x^2}\,dy=0$ 3

6. (a) Define homogeneous differential equation. Find the solution of $(x^2+y^2)dx=2xydy$ 5

   (b) Determine whether the equation $(x^2y-2xy^2)dx-(x^3-3x^2y)dy=0$ is exact or not, then solve it. 5

7. (a) When a differential equation is called Bernoulli's equation? Find the general solution of the Bernoulli's differential equation $\frac{dy}{dx}+Py=Qy^n, n\neq 1$ where P & Q are function of x alone or constant. 5

   (b) Define integrating factor. Find the solution of $(1-x^2)\frac{dy}{dx}-xy=1$ 5

8. (a) Solve the equation: $x^2y''+xy'+4y=2x\ln x$ 4

   (b) A thermometer is removed from a room where the temperature is 70°F and is taken outside where air temperature is 10°F. After one-half minute the thermometer reads 50°F. What is the reading of the thermometer at $t=1$ minute? 6