Marks

1.a.	Define politics & government.	2
b.	Mention three definitions about modern political science.	2
c.	Briefly discuss the nature of political science.	3.5
2.a.	Define economics and discuss the subject matter of economics.	3.5
b.	What is demand curve? Derive the individual demand curve with the help of a hypothetical demand schedule.	4

1. a) Discuss between electronic commerce (e-commerce) and electronic business (e-business).   3
    b) Differentiated between the role of system analysis and the role of the rest of the stakeholders   2
    c) What kind of knowledge and skills should a system analyst possess?   2
    d) Discuss the popular tool used to identify tasks in the project management life cycle.   2
    e) Show the PERT and Gantt charts. How do we decide which one to use?   3

2. a) In system analysis if you use questionnaire as fact finding process which advantages and disadvantages you can get?   4
    b) Show with example what are the most common process errors occur when a Data Flow Diagram are drawn for a system?   4

1. Simplify $F(w, x, y, z) = \Sigma(1, 3, 7, 11, 15)$ which has the don't-care conditions $d(w, x, y, z) = \Sigma(0, 2, 5)$ and show that an expression with the minimum number of literals is not necessarily unique.   7

2. Why code conversion needed? Design a BCD to Excess 5 converter with Boolean function, logic diagram, truth table and proper description.   4

3. Implement following Boolean function using any universal gate $F = ABCD + A'B'C'D' + ABC'D' + A'B'CD$.   4

Dept. of Computer and Communication Engineering
Patuakhali Science and Technology University
4th Semester (Level-2, Semester-II), Midterm Examination of B.Sc. Engg. (CSE), July-December: 2022
Course Code: CCE-223 Course Title: Database System Session 2020-2021
Credit Hour: 3.0 Full Marks: 15 Duration: 60 Minutes

1   a)   Assume that two students are trying to register for a CCE 224 course in which there is only one open seat. What component   3
of a database system prevents both students from being given that last seat? Explain with an example.

b)   Why Studying Databases? Write the purposes of Database Systems courses.   3

c)   Explain the Levels of Abstraction with university database system   3

d)   Explain why NoSQL systems emerged in the 2000s, and briefly contrast their features with traditional database systems.   3

e)   Think of different users for the university database schema as   3
STUDENT(Name, Student_number, Class Major)
COURSE(Course_name, Course_number, Credit_hours, Department)
SECTION(Section_identifier, Course_number, Semester, Year, Instructor)
GRADE_REPORT(Student_number, Section_identifier, Grade)
PREREQUISITE(Course_number, Prerequisite_number)
What types of applications would each database user need? To which user category would each belong, and what type of
interface would each need.

1	Show that the function $u = e^x(x\cos y - y\sin y)$ is a harmonic function and find the conjugate harmonic of u	7
2	Write down the application of Fourier series	2
3	Define Fourier series for even and odd function	2
4	Find the Fourier series of the function $f(x) = x^2, -\pi < x < \pi$	4

2. Show that $f(z) = u + iv = x^2 + iy^2$ is not analytic anywhere but the CR equations are satisfied at the origin only. ③

3. Define F.S. with its application and also F. Coeff. ③

4. Derive F.S. in complex form. ④

Patuakhali Science & Technology University (PSTU)
Department of Computer Science and Information Technology(CSIT)
Mid Term Examination: July-December 2022
Course Code: CCE 222 | Course Title: Digital Logic Design Sessional
Session: 2020-21, Program: B.Sc. Engg.(CSE), Semester: 4th

Marks – 15

[Answer all the questions]

1.	Design a circuit that produce output that square of the given input. Use 3 bit input to implement it with NAND gate.	15
2.	Simplify $F = A'B'C' + AB'D + A'B'CD'$ and implement it with necessary NOR gates.	15
3.	Simplify $F = w'xz + w'yz + x'yz' + wxy'z$ $d = wyz$) *and* implement it with necessary NAND gates.	15
4.	Simplify $F(A, B, C, D) = II(0, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15)$ and implement it with necessary logic gates.	15
5.	Simplify $F = \Sigma\ (0, 1, 4, 5, 7, 9, 13)$ into (a) sum-of-products form, and (b) product-of-sums form and implement both of its form with necessary logic gates.	15
6.	Show that $A\ OBOCOD = \Sigma(0, 3, 5, 6, 9, 10, 12, 15)$. and implement it.	15
7	Design a 4 bit full adder.	15

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any 5(five) of the following questions.

1.a	Describe the scope of political science.	4
b	What is political ideology? Make a list about the various political ideologies of modern political systems.	5
c	What do you mean by political authority? Prepare a comparison table according to different types of authority.	5
2.a	Briefly discuss about the seven characteristics of nation.	4
b	Narrate the sources of political legitimacy.	6
c	What are the eight elements of the roots of nationalism?	4
3.a	Differentiate the main dimensions of government and governance.	6
b	What are the differences between power and authority?	4
c	Discuss the elements of state.	4
4.a	Define economics. Distinguish between micro economics and macro economics.	3
b	What is utility? Discuss the different types of utility with example.	3
c	Differentiate between:	8

   i)   Free goods and Economic goods
   ii)   Private goods and public goods
   iii)   Theory and Law
   iv)   Value and Price

5.a	What is law of demand? Explain the law of demand with assumptions and limitations.	4
b	Discuss the non-price factors that affect demand.	4
c	Explain the law of equi-marginal utility with assumptions and limitations.	6
6.a	Define supply. Graphically explain the contraction and extension in supply, and decrease and increase in supply.	6
b	What is elasticity of supply? Graphically explain the types of elasticity of supply.	4
c	Suppose the income of a person is Tk. 40,000 per month and he purchases ten CD's per year. Let us assume that the monthly income of the consumer increases 15% and the quantity demanded of CD's per year rises to 5%. Calculate the income elasticity of demand for CD's.	4

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Dept. of Computer and Communication Engineering
Faculty of Computer Science and Engineering
Patuakhali Science and TechnologyUniversity
Dumki, Patuakhali-8602, Bangladesh

Final Examination of B. Sc. Engineering in CSE Level:2 Semester: II Session: 2020-2021

| Course Code	Course Title	July-December	Credit: 03
CCE-221	Digital Logic Design	2022	Time: 03 Hr Marks: 70

Answer any 05 out of 06 Questions (Split answers are highly discouraged)

1 [A.] Simplify $F(w, x, y, z) = \Sigma(1, 3, 7, 11, 15)$ which has the don't-care conditions $d(w, x, y, z) = \Sigma(0, 2, 5)$ and show   7
that an expression with the minimum number of literals is not necessarily unique.

   [B.]   i.   Find the complement of the function $F_1 = xyz' + x'y'z'$ and $F_2 = x(yz' + yz)$ applying De Morgan's   7
theorem.

         ii.   Prove that $f_1 = m_1 + m_2 + m_4 + m_7 = M_0 M_3 M_4 M_5$

2 [A.] Consider $F(A, B, C, D) = \Sigma(0, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15)$. Find out and show prime implicants and   7
essential prime implicants by the Karnaugh map from the above expression.

   [B.] Simplify the following Boolean function by using the tabulation method: $F = \Sigma(0, 1, 2, 8, 10, 11, 14, 15)$.   7

3 [A.] A four-bit binary number is represented as $A_3 A_2 A_1 A_0$, where A_3, A_2, A_1, and A_0 represent the individual   2
bits and A_0 is equal to the LSB. Design a logic circuit that will produce a HIGH output whenever the
binary number is greater than 0010 and less than 1000.

   [B.]   i.   Determine the output waveform for the circuit of figure.   3

         ii.   Repeat with the B input held LOW.

         iii.   Repeat with B held HIGH.

   [C.]   7
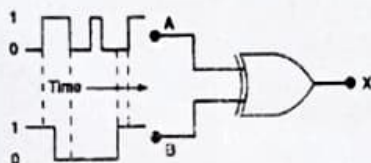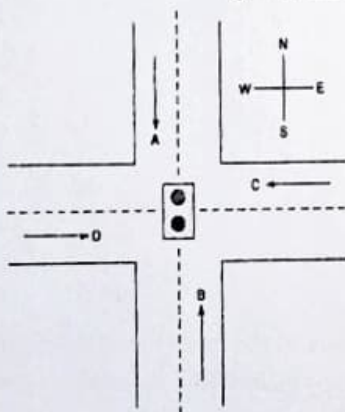
The above figure shows the intersection of a main highway with a secondary access road. Vehicle-
detection sensors are placed along lanes C and D (main road) and lanes A and B (access road). These
sensor outputs are LOW (0) when no vehicle is present and HIGH (1) when a vehicle is present. The
intersection traffic light is to be controlled according to the following logic:

     i.   The east-west (E-W) traffic light will be green whenever both lanes C and D are occupied.

     ii.   The E-W light will be green whenever either C or D is occupied but lanes A and B are not both
occupied.

     iii.   The north-south (N-S) light will be green whenever both lanes A and B are occupied but C and D
are not both occupied.

     iv.   The N-S light will also be green when either A or B is occupied while C and D are both vacant.

     v.   The E-W light will be green when no vehicles are present.

Using the sensor outputs A, B, C, and D as inputs, design a logic circuit to control the traffic light. There
should be two outputs, N-S and E-W, that go HIGH when the corresponding light is to be green. Simplify
the circuit as much as possible and show all steps.

   [D.] Implement following Boolean function using multilevel NAND gates.   2

$$F = A(B + CD) + BC'$$

4. [A.] Define universal gate. Implement a combinational circuit which convert four bit excess 3 code to four bit   **5**
BCD code.

[B.] Define adder. Implement a full-adder circuit with a decoder and two OR gates. From the truth table of the   **3**
full-adder (Section 4-3), we obtain the functions for this combinational circuit in sum of minterms: S(x,
y, z) $= \Sigma(1, 2, 4, 7)$

$$C(x, y, z,) = \Sigma(3, 5, 6, 7)$$

[C.]   Figure represents a relative-magnitude detector that takes two three-bit binary numbers, $x_2x_1x_0$ and   **3**
$y_2y_1y_0$, and determines whether they are equal and, if not, which one is larger. There are three
outputs, defined as follows:
  i. $M = 1$ only if the two input numbers are equal.
  ii. $N = 1$ only if $x_2x_1x_0$ is greater than $y_2y_1y_0$.
  iii. $P = 1$ only if $y_2y_1y_0$ is greater than $x_2x_1x_0$.
Design the logic circuitry for this detector. The circuit has six inputs and three outputs and is therefore
much too complex to handle using the truth table approach.
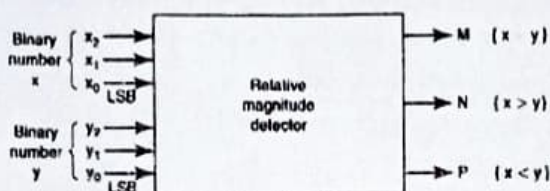
[D.] Define programmable read-only memory. Implement the following function with a multiplexer and   **3**
demultiplexures and show that the demultiplexure deliveres which was exactly combined by multiplexure.
$F(A, B, C) = \Sigma(1,3,5,6)$

5. [A.] What is flip-flop? Design a D flip-flop.   **2**

[B.]   **7**
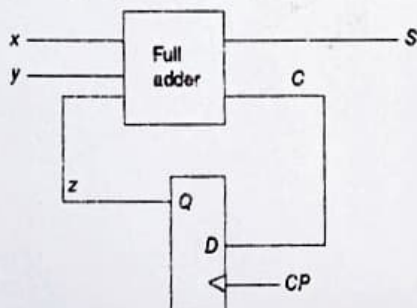
The full-adder of figure receives two external inputs x and y; the third input z comes from the output of a
D flip-flop. The carry output is transferred to the flip-flop every clock pulse. The external S output gives
the sum of x, y, and z. Obtain the state table and state diagram of the sequential circuit.

[C.] Differentiate between sequential circuit and combinational circuit. What is the problem found in RS flip-   **2**
flop? Explain how it is solved in JK flip flop.

[D.] Bring out the differences between edge triggered and level triggered flip-flip. What is the necessity of   **3**
mater-slave flip-flop? Explain working of D master-slave flip-flip. Realize with all NOR gates.

6. [A.] Define registers. Design a 4-bit register with parallel load sing D flip-flops.   **3**

[B.] What is bidirectional shift register? The content of a 4-bit shift register is initially 1101. The register is   **4**
shifted six times to the left, with the serial input being 101101. What is the content of the register after
each shift?

[C.] Define binary ripple counter. Determine and show the count sequence for a binary ripple counter.   **3**

[D.] Design the basic memory unit architecture showing communication with environment. Show the   **4**
construction of a Johnson counter.

Dept. of Computer and Communication Engineering
Faculty of Computer Science and Engineering
Patuakhali Science and Technology University
Dumki, Patuakhali-8602, Bangladesh

Final Examination of B. Sc. Engineering in CSE Level: 2 Semester: II Session: 2020-2021

Course Code	Course Title	July-December	Credit: 03
CCE 223	Database System	2022	Time: 03 Hr

Marks: 70

Answer any 05 out of 06 Questions (Split answers are highly discouraged)

1 [A.] Explain the various terminology with properties of the below RDBMS.   4

EMP_ID	ENAME	POST	Salary
E1	Rahul	Clerk	20000
E2	Kapil	Manager	80000
E3	Mukesh	Clerk	20000
E4	Manoj	Peon	10000

[B.] Consider the university database schema as follows. Write the relational algebra expression based on   5
the query.

classroom(building, room_number, capacity)
department(dept_name, building, budget)
course(course_id, title, dept_name, credits)
instructor(ID, name, dept_name, salary)
section(course_id, sec_id, semester, year, building, room_number, time_slot_id)
teaches(ID, course_id, sec_id, semester, year)
student(ID, name, dept_name, tot_cred)
takes(ID, course_id, sec_id, semester, year, grade)
advisor(s_ID, i_ID)
time_slot(time_slot_id, day, start_time, end_time)
prereq(course_id, prereq_id)

a. Find the ID and name of each instructor in the Physics department.
b. Find the ID and name of each instructor in a department located in the building "Watson".
c. Find the ID and name of each student who has taken at least one course in the "Comp. Sci."
department.
d. Find the ID and name of each student who has taken at least one course section in the year 2018.
e. Find the ID and name of each student who has not taken any course section in the year 2018.

[C.] Draw the ER diagram of your 18th batch management system.   3
[D.] Consider the foreign-key constraint from the dept_name attribute of instructor to the department   2
relation. Give examples of inserts and deletes to these relations that can cause a violation of the
foreign-key constraint. Follow above schema.

2 [A.] Suppose you are given a relation grade points (grade, points) that provides a conversion from letter   6
grades in the takes relation to numeric scores. Given the preceding relation, and our university schema,
write each of the following queries in SQL. You may assume for simplicity that no takes tuple has the
null value for grade.
   a.   Find the total grade points earned by the student with ID '12345', across all courses taken by
the student.
   b.   Find the grade point average (GPA) for the above student, that is, the total grade points divided
by the total credits for the associated courses.
   c.   Find the ID and the grade-point average of each student.
   d.   . Insert every student whose tot_cred attribute is greater than 100 as an instructor in the same
department, with a salary of 10,000 taka.

[B.]   a. The SQL like operator is case sensitive (in most systems), but the lower() function on strings   5
can be used to perform case-insensitive matching. To show how, write a query that finds
departments whose names contain the string "sci" as a substring, regardless of the case.

b. Consider the SQL query:

select p.a1
from p, r1, r2
where p.a1 = r1.a1 or p.a1 = r2.a1

Under what conditions does the preceding query select values of p.a1 that are either in r1 or in r2? Examine carefully the cases where either r1 or r2 may be empty.

c. Using the university schema, write an SQL query to find the IDs of those students who have retaken at least three distinct courses at least once (i.e, the student has taken the course at least two times).

[C.] Differentiate between SQL, MySQL, and SQL Server.   3

3 [A] Perhaps the most important data items in any database system are the passwords that control access   3
to the database. Suggest a scheme for the secure storage of passwords. Be sure that your scheme allows the system to test passwords supplied by users who are attempting to log into the system.

[B During its execution, a transaction passes through several states, until it finally commits or aborts.   3
List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur.

[C] Explain the transaction property with an example of transaction T1 and T2.   4

[D] Consider this schedule of two transactions: 4

(a)   (b)

T1	T2
Read (A)	
	Write (B)
Write (A)	

T1	T2
Read(X)	
	Read(X)
Write(Y)	
	Write(Y)
commit	
	commit

Is this schedule: serializable? Conflict serializable? Or both explain your own answer?

4 [A.] UGC wants to give scholarship to some students on the following criteria: 7
    a. Student must be of CSE Faculty of PSTU (02 in the student ID means CSE Students)
    b. Students must be female
    c. Student do not get any other private scholarships such like **Ankur** scholarship
    d. Grade must be at least 3.75
    e. Student should not be punished for any awful activity

Create necessary table (yourself) and write necessary query for i, ii, iii, iv and v.

[B.] Clarify the different types of database keys with examples.   7

5 [A.] a. "An 'expired' account is different from a 'locked' account"-explain the statement with   7
appropriate example.
    b. "PASSWORD_REUSE_MAX or PASSWORD_REUSE_TIME are mutually exclusive"-
provide an explanation for the assertion with appropriate instance.

[B.] Explain what normalization is and provide specific examples for each kind of normalization.   7

6 [A.] Give an example which shows a statement-level BEFORE DELETE trigger on the BOOKSHELF   7
table. When a user attempts to delete a record from the BOOKSHELF table, this trigger is executed and checks two system conditions: that the day of the week is neither Friday nor Saturday, and that the Oracle username (Student ID) of the account performing the delete include the Student ID's 3rd and 4th digit equal "02" in respect of PSTU ID management of the students.

[B.] Describe the various types of attributes with an appropriate example.   7

[Figures in the right margin indicate full marks. **Split answering of any question is not recommended**. Write the full question number e.g. 4(b)(ii) before the answer paragraph]

Answer any 5 of the following questions

1. a) What are business to consumer (B2C) and business to business (B2B) Web applications, and what are some examples of each type? List out some of the business drivers for today's information system. 3

   b) You are a new systems analyst and eager to prove your abilities on your first project. You are at a problem analysis meeting with the system owners and users and find yourself saying, "we need to do this to solve the problem," into what common trap are you in danger of falling? What technique could you use to avoid the trap? 3

   c) Why do many new systems analysts fail to effectively analyze problems? What can they do to become more effective? 2

   d) Briefly describe the four steps in a system development process. Discuss what happens in each step? 4

   e) Assume you are a systems analyst who will be conducting a requirements analysis for an individually owned brick-and-mortar retail store with a point-of-sale system. Identify who the typical internal and external users might include? 2

2. a) As a new project manager in a rapidly growing organization, you have been asked to lead a project team for an important project. The scope of the project is not too broad, project time frames are somewhat on the tight side but definitely doable, and the budget is more than generous. In fact, you have been given the authority to hire as many people as you want for your project team.
   You estimate that 5 people would be about right for this type of project, 8 would provide a healthy amount of backup, and 10 could give you the resources to deliver an outstanding system in record time. What is something you might want to keep in mind before making your decision on how many people to hire? 2

   b) What is the trigger for communicating the project plan, and who is the audience? Why is communicating the project plan important? 2

   c) Show the business factors that are driving system analysis. Based on these factors, what should system analysis address? 2

   d) Briefly describe about the eight major activities in the project management life cycle. 5

   e) Which responsibility project managers do to manage changes that occur and/or are requested during a project? List out the factors to consider in estimating task durations. 3

3. a) What is the objective of refining the Use-case model in object design? Why is it important? 2

   b) Why do many new systems analysts fail to effectively analyze problems? What can they do to become more effective? Show the categories of resources to be allocated to the project. 4

   c) Show the commonly used technique for prioritizing system requirements. 2

   d) Describe the steps needed to construct the state chart diagram. Show the relationship between an object state and state transition event. 3

   e) Define the visibility in object-oriented design. Explain the different levels of visibility. Why are the three kinds of objects needed in object-oriented design? 3

4. a) i. What do you mean by information systems and technology? 7
      ii. "A dollar today is worth more than a dollar one year from now"-What is the significance of this statement?

   b) i. What is the number of symbols required for a Data Flow Diagram? How is it different from an ERD? 7
      ii. Provide examples of data flows that are illegal.

5. a) i. What actions should I take and what should I avoid during an interview session? 7
      ii. "The time value of money is not taken into account for Payback Analysis"- Explain the statement with appropriate example.

   b) i. Make the distinction between databases and conventional files. 7
      ii. Explain the various types of questionnaires. Outline the advantages and disadvantages of questionnaires.

6. a) i. What are the benefits and drawbacks of interviews? 7
      ii. Give an explanation of the following terms:
         a. Body language,
         b. spatial zones,
         c. Office automation systems

   b) i. What are the most common process errors that result from drawing a Data Flow Diagram for a system? 7
      ii. What does the following mean?
         a. Proxemics
         b. Expert systems
         c. Brainstorming.

Patuakhali Science and Technology University

4th semester (L-2, S-II) Final Examination of B.Sc. in Engg. (CSE), July-Dec-2022, Session: 2020-21
Course Code: MAT-221, Course Title: Mathematics-IV
Marks-70,   Time: 3 hours,   Credit: 3.00
[Figure in the right margin indicates full marks. Split answering of any question is not recommended]
Answer any 5 of the following questions.

1. a) Define Fourier series and derive its complex form.   04

   b) Define the half range Fourier series   02

   c) Expand the Fourier series for the following function   08

   $$f(x)=\begin{cases} 0 & \text{when } -\pi < x < 0 \\ \dfrac{\pi x}{4} & \text{when } 0 < x < \pi \end{cases}$$

   and hence prove that $\dfrac{\pi}{4}=1-\dfrac{1}{3}+\dfrac{1}{5}-\dfrac{1}{7}+\ldots$

2. a) Explain Fourier integral and Fourier tra..sformation with its applications   05

   b) Find the Fourier integral of the function $f(x)=e^{-x}, x \geq 0$ 04

   c) Find the Fourier sine transformation of $F(x)$ where   05

   $$F(x)=\begin{cases} x, & 0 < x < 1 \\ 2-x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$$

3. a) Define Laplace transform.   02

   b) State first translation or shifting property.   02

   c) Find the Laplace transform of $e^{2t}(cos3t - sin4t)$.   02

   d) Applying the Laplace transformation solve the following ordinary differential equation   08

   $$\frac{d^3Y}{dt^3}+\frac{d^2Y}{dt^2}=e^t+t+1, \; Y(0)=Y'(0)=Y''(0)=0$$

4. a) Define Harmonic function.   02

   b) State and prove the necessary condition of the Cauchy-Riemann equations.   05

   c) Find the conjugate harmonic function of $u=y^3-3x^2y$.   05

   d) Find the modulus and principal argument of $\left(\dfrac{1+(\sqrt{3})i}{1-(\sqrt{3})i}\right)^2$.   02

5. a) Show that $f(z)=2x+ixy^2$ is nowhere analytic.   02

   b) State Cauchy's Integral formula for n[th] order derivative. If $f(z)$ is analytic for all points   05
   inside of C and connected a simple closed curve C. a is any point inside C. Then
   $$f(a)=\frac{1}{2\pi i}\oint \frac{f(z)}{z-a}dz.$$

   c) Evaluate: $\oint_C \frac{ze^z}{(z-1)^3}dz$, where C is the circle.   04

d)

Show that $\left(\dfrac{a^n}{n!}\right)^2 = \dfrac{1}{2\pi i}\int_c \dfrac{a^n e^{at}}{n!\,z^{n+1}}dz$.   03

6. a) Define residue.   02

   b) State and prove Cauchy's residue theorem.   06

   c) Evaluate the contour integration $\displaystyle\int_0^{2\pi} \dfrac{d\theta}{5+3\sin\theta}$ 06

Patuakhali Science & Technology University (PSTU)
Department of Computer Science and Information Technology(CSIT)

Marks - 70

[Answer the marked questions]

Section A (Use Simulator to Implement)

1. Design a combinational circuit which accepts a two-bit number and generates an output binary number equal to the cube of the input number.　　2

2. *Implement following Boolean function using exclusive or and AND gates*
   $F = ABCD + A'B'C'D' + ABC'D' + A'B'CD$　　2

3. With 2×1 mux implement XOR gate and AND gate.　　2

4. Design a D Flip-flop.　　2

5. Design a T Flip-flop.　　2

6. Design a circuit that compares two 4-bit numbers, A and B, to check if they are equal. The circuit has one output x, so that $x = 1$ if $A = B$, and $x = 0$ if $A \neq B$.　　2

Section B (Use Circuit board to Implement by group work)

7. Design a adder that can add two decimal numbers as following.　　2

$$\begin{array}{c} A\,B\,C\,D \\ +P\,Q\,R\,S \\ \hline W\,X\,Y\,Z \end{array}$$

8. Design a BCD-to-seven-segment decoder is a combinational circuit that accepts a decimal digit in BCD and generates the appropriate outputs for selection of segments in a display indicator used for displaying the decimal digit. The seven outputs of the decoder (a, b, c, d, e, f, g) select　(a) Segment designation　　2

(b) Numerical designation for display

the corresponding segments in the display as shown in Fig. (a). The numeric designation chosen to represent the decimal digit is shown in Fig. (b). Design the BCD-to-seven-segment decoder circuit.

9. Lab Report　　5 10

10. Viva-Voce　　15