

Time: 90 minutes

Total Marks: 100

1. Write output for the following code segment. Explain briefly.

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```
double a,b;
int x;
char y;
a = 100.14159625;
b = 3.97;
x = a + b;
y = (int)a + (int)b;
printf("%lf %d %lf %c %d",a, x, b, x, y);
```

8

2. Write scanf statement for taking input for the following scenarios:

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1. Two doubles separated by spaces.
2. Three integers separated by commas.
3. A time (Format h:m:s)
4. A date (Format d/m/y)
5. Two 3 digit integers and One 2 digits integers not separated by spaces.

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3. A lucky number is a number which has only 4 and 7 as it's digit. For example, 4, 7, 47, 74, 777 etc. all are lucky number, whereas 45, 777741, 70 are not lucky numbers, as they contain digits other than 4 or 7. Write a program, which given an integer N as input, determines whether N is a lucky number or not.

20 20
6+2

4. Write a program, which given N words, finds the lexicographically smallest word. (To get full marks on this, you need to use your own defined functions. Using library functions will reduce your score for this question)

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5. You are given the co-ordinates of two points (lower left and upper right) for two axis parallel rectangles. Write a program to determine their area of their common intersecting part.

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Sample:

0 0 10 10

5 5 15 15

Area of intersection: 25.00



2

6. Write a function digit_wise_multiplication(), which will take two integers A and B as parameters and return another integer as result. The result should be obtained by digit-wise multiplication of A and B. For digit-wise multiplication, you take corresponding digits of A and B, multiply them, and put only the rightmost digit of the multiplication as the corresponding digit of the result. If one integer has more digits than the other, then you should think that the corresponding digits are zero in those positions.

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16

Example Input	Output for Example Input
123 345	385
343434 333333	929292
1234 111	234

7. Write a program which given a string, finds the minimum length substring which repeated to produce the original string. For example, for string "abababab" the answer should be "ab". For "abcde" the answer should be "abcde". Your program will be judged based on the efficiency of your solution.

10

Incourse Examination
First Year 2nd Semester-2019
EEE-1202: Digital Logic Design

Full Marks- 30

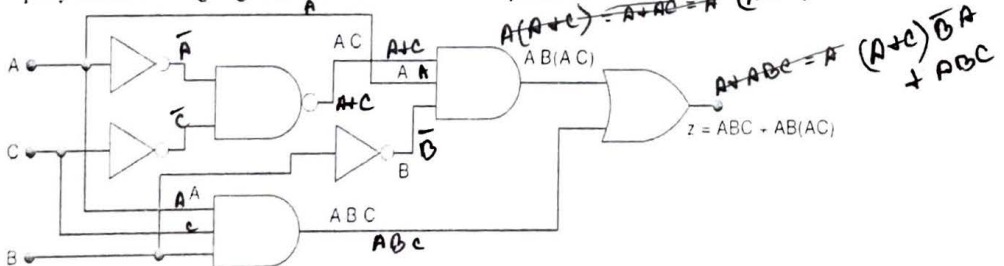
Time 1 Hour 30 Minutes

Answer all the questions.

1. Define digital system and analog system. What are the advantages and disadvantages of digital system over analog system? 2
2. Briefly explain Decimal, Hexadecimal, Octal and Binary number representation system. Convert decimal number 181 to its corresponding Binary, Octal and Hexadecimal numbers. 4
3. What do you mean by BCD code? What are the differences between BCD and straight binary number representation? Explain using example. 2
4. What are universal gates? How can we implement the functions of three basic logic gates using NOR gates? Explain. 3
5. Write the logical expression for the following truth tables, simplify it and finally draw the corresponding logical circuit. 4

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

6. Briefly explain DeMorgan's theorems those are extremely useful in simplifying expressions in which a product or sum of variables is inverted. 3
7. Write the truth table and symbol of exclusive-OR and exclusive-NOR gates. Draw the equivalent circuit of exclusive-OR and exclusive-NOR gates using NAND gate. 4
8. Simplify the following logic circuit and draw the simplified circuit 4



9. How K-maps are used to simplify logical expressions or truth tables? Explain using a four input truth tables. 4

$$\begin{aligned}
 & \overline{A\bar{B}} + \overline{A}B \\
 &= \overline{A\bar{B}} + \overline{A}B \\
 &= (\overline{A} + B)(A + \bar{B}) \\
 &= \overline{A}A + \overline{A}\bar{B} + AB + B\bar{B} \\
 &= \overline{A}\bar{B} + AB
 \end{aligned}$$

N.B.: Answer any 4 (FOUR) questions.

1. Evaluate (i) $\int e^x \cos x dx$ by repeated integration by parts.

(ii) $\int \frac{x^2 + x - 2}{3x^3 - x^2 + 3x - 1} dx$

2. (a) Find the arc length of the curve $y = x^{\frac{3}{2}}$ from $(1, 1)$ to $(2, 2\sqrt{2})$. 2.0858

(b) Find the area of the surface that is generated by revolving the portion of the curve $y = x^{\frac{3}{2}}$ between $x = 0$ and $x = 1$ about the x -axis. $\frac{\pi}{27}(10\sqrt{10} - 1)$

3. (a) Define polar coordinate system. Change the coordinates $(6, \frac{2\pi}{3})$ to Cartesian co-ordinates. $(-3, 3\sqrt{3})$

(b) Find the area of the region in the first quadrant that is within the cardioid $r = 1 - \cos \theta$. 0.1781

4. (a) Define improper integral. Evaluate $\int_{-x}^x \frac{1}{1+x^2} dx$.

(b) Prove that $\int_1^x \frac{1}{x^p} dx = \begin{cases} \frac{1}{p-1} & \text{if } p > 1 \\ \text{diverges} & \text{if } p \leq 1 \end{cases}$

5. (a) Find the arc length of the spiral $r = e^\theta$ between $\theta = 0$ and $\theta = \pi$. $\frac{1}{2}(e^\pi - 1)$

(b) Sketch the graph of the equation $r = \sin \theta$ in polar coordinates. 0

6. (a) Find the point on the cardioid $r = 1 - \cos \theta$ at which there is a horizontal line, a vertical line and a singular point.

(b) Find the area of the whole region of $r = \cos 2\theta$.

$$\int_2(e^x - 1)$$

$$1 - 2$$

$$\begin{aligned} x &= \pm \sqrt{-1} \\ x^2 &= -1 \\ 3x - 1 &= x \end{aligned}$$

$$\sqrt{102 + (200/10)^2} d\theta$$

$$2\pi y \sqrt{1+y^2} dx$$