Part A

Shahjalal University of Science and Technology
Institute of Information and Communication Technology
Software Engineering
Final Examination, 1st Year 1st Semester
Course No: SWE-121 **Course Title:** Structured Programming Language
Credits: 3 **Full Marks:** 30

Part A

[Answer all the questions]

1. **A C program contains the following statements:**

```
#include<stdio.h>
  short a;
  long b;
  char c;
  double d;
```

Write appropriate scanf() and printf() functions to enter the values and print them.

2. Is there any problem/error with the program below? If there is error, correct and write the output generated by the following program. Otherwise, just write the output of the program.

```
#include<stdio.h>
int main () {
    float x,i;
    for (i=1; i<=20; i=i+2) {
          x=function1(i);
          printf("%d\n", x);
    }
    return 0;
}

float function1(float a) {
      float b = a % 10;
      b *= b;
      return b;
}
```

3. Write output of the following code snippet.

```
#include<stdio.h>
int main() {
   int i, j, k, x = 0;
   for (i = 0; i < 6; ++i) {
      for (j = 0; j < i; ++j) {
         switch (i + j - 1) {
            case -1:
            case 0:
               x += 1;
               break;
            case 1:
            case 2:
            case 3:
               x += 2;
            default:
               x += 3;
         }
         printf("%d ", x);
      }
   }
   printf("\nx = %d", x);
   return 0; }
```

Part B

Part B

[Answer all the questions]

4. Convert the following **while** loop to **do-while** loop and write the output generated by the following program.

```
#include<stdio.h>
void main(){
   int i=1, j=5;
   while ((i<=5) && (j>=0)){
       printf("It is a test\n");
      i++;
      j--;
   }
}
```

5. Write the output of the following program-

```
int main () {
    int a=626;
    int b=5;
    float c=a/b;
    int d=a/b;
    printf("%.2f ", c);
    printf("%d", a++);
    printf("%d", --a);
    printf("%d",(a--)+1);
    printf("%d", ((a++) + (a++)));
    printf("%d",a++);
    printf("%d", ++a);
}
```

6. Write the output of the following programs.

i.

```
#include<stdio.h>
void main(){
  int a[10] =
{0,1,2,3,4,5,6,7,8,9};
   int i;
 for(i=0;i<10;i++)
     a[i]=a[i]+i;
 for(i=0;i<10;i++)
     printf("%d\n", a[i]);
}
```

ii.

```
#include<stdio.h>
int c[10] =
{1,2,3,4,5,6,7,8,9,0};
main(){
  int a,b=0;
  for(a=0;a<10;++a)
     if((c[a]%2)==1) b+=c[a];
     printf("%d",b);
}
```

Question

Institute of Information and Communication technology
BSc in Software Engineering
1st Year 1st Semester Final Examination – 2020
Course: SWE 123 (Discrete Mathematics)

Credit: 3.00 Full Marks: 30

Part A

Q.1. Answer the following questions.

a) Define Minimum Spanning Tree. What do you mean by a Planer Graph? **5**

b) Find if the relations R1, R2 are reflexive, symmetric, anti-symmetric, transitive or none of the above- **5**
R1 = {(1,1), (1,2), (1,4), (2,1), (2,2), (3,3), (4,1), (4,4)}
R2 = {(1,1), (1,2), (1,3), (1,4), (2,2), (2,3), (2,4), (3,3), (3,4), (4,4)}
Also represent the relations using directed graphs.

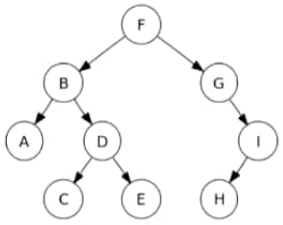


Figure 1

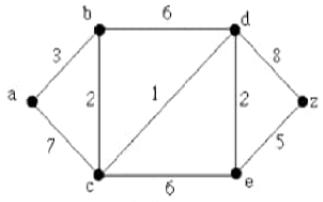


Figure 2

c) Using Dijkstra's algorithm to find a shortest path from a to z on Figure 2. **5**

Part B

Q.2. Answer the following questions.

a) Which of the directed graphs in figure 3 have a Euler circuit? Of those that do not, which have an Euler path? **5**

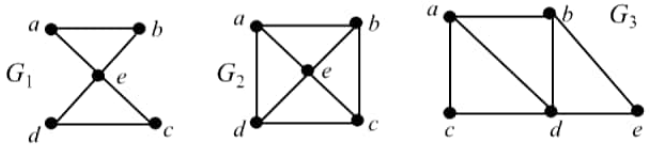


Figure 3

b) Draw the graphs of the following functions- **5**

i. $F(x) = \lfloor x - 2 \rfloor + \lfloor x + 2 \rfloor$
ii. $F(x) = \lfloor 2x \rfloor$

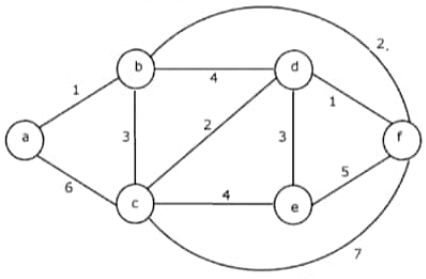


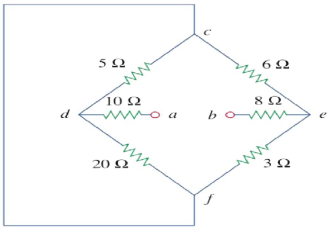
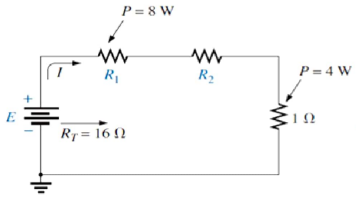
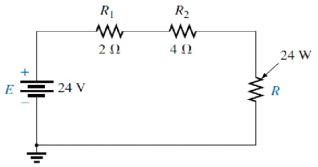
Figure 4

c) Use Kruskal's algorithm to find a minimum spanning tree in the graph shown in figure 4. **5**

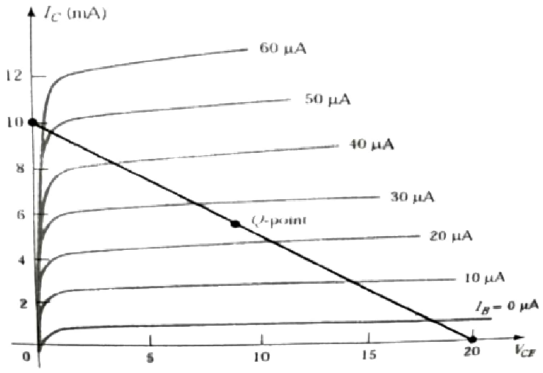
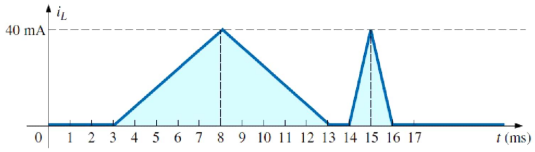
Shahjalal University of Science and Technology, Sylhet
Institute of Information and Communication Technology
B. Sc. (Engg.) in Software Engineering
1st Year 1st Semester Final Examination-2020
Session: 2019-20
Course Code: EEE 101W Course Title: Basic Electrical and Electronic Circuits
Credits: 3.0 Total Marks: 30

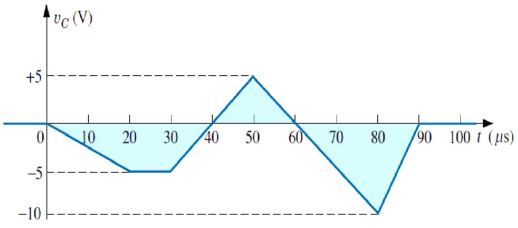
Part A (Answer all the questions)

1.

(a)	Find the equivalent resistance of the circuit as shown in figure: 1 (a).  Figure: 1 (a)	**3**
(b)	Find the unknown quantities for the circuits in figures: 1.b (i) and 1.b (ii)  Figure: 1.b (i)  Figure: 1.b (ii)	**3**
(c)	For a parallel circuit if the current ratio is 3:6:12. Find the ratio of resistance.	**1.5**

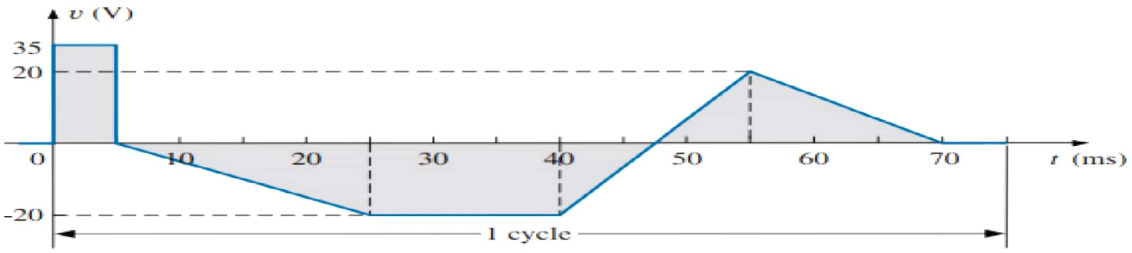
2.

(a)	The load line and the defined Q-point are given in Fig. 2 (a). Determine the required values of V_{CC} , R_C and R_B for a fixed-bias configuration.  Fig. 2 (a)	**1.5**
(b)	Find the waveform for the voltage induced across a 200 mH coil if the current through the coil is as shown in figure: 2 (b).  Figure: 2 (b)	**3**

(c)	Find the waveform for the average current if the voltage across the 4.7 μF capacitor is as shown in Figure: 2 (c).  Figure: 2 (c) Also determine the value of capacitor current at 20 μs, 55 μs and 75 μs.	**3**

Part B (Answer all the questions)

3.

(a)	What is Universal Gate and why they are called universal gate?	**1.5**
(b)	Find the average value and rms value of the periodic waveform of **Figure 3 (b)** over one full cycle.  Figure: 3 (b)	**2**
(c)	Find the phase relationship between the following waveforms: **i)** $v = 2\cos(\omega t - 30°)$, $i = 5\sin(\omega t + 60°)$ **ii)** $v = -4\cos(\omega t + 90°)$, $i = -2\sin(\omega t + 10°)$	**2**
(d)	Determine the average power delivered to networks having the input voltage and current of the following waveforms. Also determine the power factors, and indicate whether they are leading or lagging. **i)** $v = 100\sin(\omega t + 40°)$, $i = 20\sin(\omega t + 70°)$ **ii)** $v = 150\sin(\omega t - 70°)$, $i = 3\sin(\omega t - 50°)$	**2**

4.

(a)	i) Obtain the simplified expressions in sum of products for the Boolean function F and implement the simplified function using basic gates. F (w, x, y, z) = Σ (1, 3, 7, 11, 15) F has the don't care conditions d (w, x, y, z) = Σ (0, 2, 5). ii) Also express the original function F in products of maxterms.	**2**
(b)	Design a circuit that will turn on a LED only if 4 bit binary number B is less than a 4 bit binary number A.	**2**
(c)	Implement full adder with the help of (i) NAND gates (ii) NOR gates.	**3.5**

Shahjalal University of Science and Technology
Institute of Information and Communication Technology
1st Year 1st Semester Final Exam 2020
Course Code: MAT 105W
Course Title: Coordinate Geometry and Calculus
Marks: 30

Group A

[Answer any two questions]

1. a) Find the domain and range of $(i) f(x) = \ln(x-1)$ **4**

$(ii) f(x) = e^x + 1$

and Draw the graph

b) Discuss the difference liability at $x = \frac{\pi}{2}$ of the function **3.5**

$$f(x) = \begin{cases} 1; x < 0 \\ 1 + \sin X; \ 0 \le X \le \frac{\pi}{2} \\ 2 + \left(x - \frac{\pi}{2}\right)^2 ; x \ge \frac{\pi}{2} \end{cases}$$

2. a) State Leibnitz's theorem of differentiation. If $y = \cos[\ln(1+x)]$ the show that $(1+x)^2 y_{n+2} + (2n+1)(1+x)y_{n+1} + (n^2+1)y_n = 0$ **2.5**

b) Write down the 2nd derivative test for maximum and minimum value of a function. Find the critical point of $f(x) = x + \frac{625}{x}, x \in (0, \infty)$. Also determine the maximum or minimum value of $f(x)$. **3**

c) If u is a function of r alone where $r^2 = x^2 + y^2 + z^2$ then show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = \frac{d^2 u}{dr^2} + \frac{2}{r}\frac{du}{dr}$ **2**

3. a) Evaluate the following integral: **3.5**

$$\int \frac{8^{1+x} + 4^{1-x}}{2^x} dx$$

b) Evaluate that $\int_0^\infty \frac{x dx}{(x^2+a^2)(x^2+b^2)}$ when a, b > 0 **4**

Group B

[Answer any two questions]

4. a) Obtain the reduction formula for $\int \cos^n x \, dx$ and then evaluate $\int \cos^8 x \, dx$ **3.5**

b) Find the volume of solid obtained by rotating the region bounded by the curves $y = 2x^2$ & $y = x + 1$ and the x axis about the x axis. **4**

5. a) Reduce the conic $8x^2 + 4xy + 5y^2 - 24x - 24y = 0$ to its standard form. **5**

b) What rotation is required to remove the xy – term from the conic $x^2 + 2\sqrt{3}\,xy + 3y^2 + 2\sqrt{3}\,x - 2y = 0$ **2.5**

6. a) Find the magnitude and the equation of S.D between the lines $\frac{x-8}{3} = \frac{y+9}{-16} = \frac{z-10}{7}$ & $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$ **3.5**

b) Find the equation of the spheres which passes through the circle **4**

$$x^2 + y^2 + z^2 - 4x - y + 3z + 12 = 0, \quad 2x + 3y - 7z - 10 = 0$$

& touch then plane $x - 2y + 2z = 1$

Shahjalal University of Science and Technology

Institute of Information and Communication Technology

Software Engineering

Final Examination, 1st Year 1st Semester

Course Code: PHY 103W Credits: 3 Course Title: Mechanics, Wave, Heat & Thermodynamics

Total Marks: 30

Group A

[Answer all the questions]

1)	**a**. What do you mean by Projectile motion? **b**. Find the expressions for horizontal range and maximum height of a projectile.	**1+4=5**
2)	**a**. Define conservative force. **b.** A particle moving alone an x-axis is subjected to a force **$F(x) = (6x^2 + 2x)$ N.** Find the work done by the force as the particle moves from x = -1m to x = 2m.	**1+4=5**
3)	**a**. What is Doppler Effect? **b.** An observer on the railway platform observed that a train passed through the station at 72km/hr., the frequency of the whistle appears to drop by 500 Hz. Find the frequency of the whistle. (velocity of sound in air = 340 m/s).	**1+4=5**

Group B

[Answer all the questions]

4)	**a.** Define plane progressive wave. **b.** A wave along a string is given by the relation, y = 0.02 sin (30t – 4x), where x is in metres and t is in second. Find its amplitude, frequency and speed.	**2+3=5**
5)	**a**. Define Simple Harmonic Motion (SHM). **b**. Simple Harmonic Motion of a particle is represented by the following wave equation: $Y = 12 \sin \left(\frac{2\pi}{10} t + \frac{\pi}{4} \right)$ Calculate i) amplitude, ii) frequency, iii) velocity and acceleration at t = 2.5 sec.	**1+4=5**
6)	**a**. What are the causes of friction? **b**. A force of 68N is needed to start 8 kg box moving across a horizontal surface. **i)** Calculate the coefficient of static friction **ii)** If the box continues to move with an acceleration of 14 m/s^2, what will be the co-efficient of kinetic friction?	**1+4=5**

Shahjalal University of Science & Technology, Sylhet
Institute of Information and Communication Technology
1st Year 1st Semester Final Examination 2020
Course Code: ENG 101; Course Title: Effective Communication in English
Session: 2019-2020; Credits: 3
Full Marks: 30

Part A

Read the passage below and answer question no. 1 and 2

It's Okay to Fail

Adhora Ahmed

The idea of success is ingrained within us since birth. Why not? We like success stories, even if they incite envy within us. We like setting goals in order to be better than what we already are. Above all, we like how success makes us feel, especially the relief and the newfound confidence that makes all the hard work worthwhile.

However, let's not forget that failure is the pillar of success. You don't have to hear the stories of Oprah Winfrey or J. K. Rowling to know that behind every success, there are many failed attempts. Your life experiences are full of such stories. Perhaps your parents often share the anecdote of how many times you fell before you could take your first steps as a toddler, all by yourself. Maybe you remember the teacher who would always try to bring you down by asserting that you'd never pass their subject, only to prove them wrong by getting the highest marks. The point is, there is no success without failure.

If you weigh your successes against your failures, the scales would tip heavily in terms of the latter. Thus, it is obvious that stories of failure are more common. Yet, how many stories do we hear about restarts, botched attempts, aborted missions or broken dreams? We do, but often in whispers when the afflicted person isn't around, accompanied by either pitiful sighs or smug grins. The shame attached to these stories are somewhat shed if the failures are punctuated by successes. Would any of us care if J. K. Rowling had never reached the level of success she has now? Most probably not.

Living in a success-oriented world means that failure is relegated to a taboo topic, unless it can be justified with a form of success that outshines it. Our society expects us to be successful, to overcome often formidable hurdles. We are expected to be on good terms with everyone, get good grades, get a good job that pays well, get married and start a family – the list goes on. Our society also expects us to be proud of our successes, because we love hearing about them.

Just take a look at your social media feeds. You will see people announcing whatever good things happen in their lives, whether it's a new job, an engagement, or simply a nice painting. It gives the impression that everyone is living well and happily. Most importantly, our society wants us to work hard to taste that sweet fruit. There's nothing wrong with that; success without perseverance and hard work is like trying to turn back time.

However, there's another component that is crucial to success that we don't talk about enough: luck.As we all know, the year 2020 has turned all our expectations and plans upside down and inside out, and the crisis does not seem to be resolved soon. The well-performing employee who was hoping to get promoted lost their job. The couple who was planning to get married saw their relationship fall apart. The HSC candidate, who would've been busy with university admissions right now, waited for months to know if their exams would be cancelled. I myself was planning to go abroad for higher studies. All of these cases were struck by dumb luck.

Sometimes, even though you might put all your effort into achieving something, luck turns its favours away. Sometimes, the situation and the circumstances are out of your control. None of us imagined that a virus, invisible to the naked eye, would make us taste the bitterness of failure. But luck played a trick and that's what happened.

So, should you beat yourself up over your failures last year? No, because it's not your fault.

Does that mean all your hard work was for nothing? No, because what matters is that you tried your best.

Among the many things last year has taught us is the value of failure. Although we try to hide our sob stories without happy endings and avoid sharing them on our timelines, we often forget that failure teaches us way more than success does. After all, we learn the best from our mistakes, the botched attempts that urge us to restart and inch towards a successful one.

(Edited. Taken from The Daily Star)

1. **Fill in the gaps below. Choose the words from the passage above.** **5x1=5**
   - All the struggles become meaningful because of the feeling of relief and (a)_____
   - If you measure the weight of your successes against your failures, (b)_____ will be the heavier one.
   - We receive the stories of failure accompanied by either (c)_____ or smug grins.
   - Accomplishment without (d)_____ and hard work resembles attempting to turn back time.
   - The (e)_____ caused in 2020 doesn't appear to be settled soon.

2. **Do the following statements agree with the views of the writer in the reading passage? In your answer sheet, write:**

   - **YES-** **if the statement agrees with the writer's view**
   - **NO-** **if the statement contradicts the writer's view**
   - **NOT GIVEN-** **if it is impossible to say what the writer thinks about this**

   5x1=5

   a) We wouldn'thave cared about her failures if J. K. Rowling had never reached the level of success she has now.
   b) Our society anticipates that we shouldn't be proudof our triumphs, since we don't love hearing about them.
   c) Social Media mostly project the happiness and success of a person's life.
   d) Luck is an optional part of being successful.
   e) Married couples could not have their baby because of the bad luck in 2020.

3. **Complete the following expressions:**
   5x1=5
   a) If the police come looking for you, _____
   b) If the traffic was not so bad, _____
   c) If you had moved to the UK, _____
   d) I will help you carry the piano if _____
   e) You should not have gone to work today since _____

Part B

4. **Write argumentative essay on the following topic. You should write at least 250 words.** **15**

   a) Some people think that the best way to solve global environmental problems is to increase the cost of fuel. To what extent do you agree or disagree?