

1st Year 1st Semester B.Sc (Honors) Final Examination 2021

Course Code: ICT-1101

Full mark: 60

Course title: Introduction to ICT

Time: 3 hours

Answer any FIVE of the following questions. Numerals within parenthesis at the end of each question indicates the marks allocated to it.

1. a) Why printer driver is necessary? What are the advantage and disadvantage of having higher resolution in a monitor? (3)
b) List various categories of input device with examples from each category. (3)
c) Differentiate between –
 - (i) speech recognition and speech synthesis
 - (ii) impact and non-impact printers
 - (iii) CRT and LCD monitors .

(3 × 2 = 6)
- 2 a) What does processing mean? What other functions does the CPU perform besides processing? (3)
b) Briefly explain 'upward' and 'downward' compatibility. (3)
c) Define the term 'bus'. Which bus is unidirectional and which one is bidirectional? Given below some bus architectures used in microcomputer. Identify their manufacturer and data-length capacity: PCI, MCA, ISA, EISA (5)
d) List some factors that affect the processing speed of a computer. (1)
- 3 a) Which memory is called volatile memory and why? (2)
b) Differentiate between -
 - (i) Primary and Secondary memory
 - (ii) EPROM and EEPROM

(2 × 2 = 4)

c) Memory can be classified according to a number of criteria. List some of them. (2)
d) Given below some memory devices. Identify them as volatile, non-volatile, semiconductor, optical and magnetic memory: (8 × ½ = 4)
RAM, CD, Floppy Disk, Pendrive, Cache Memory, Harddisk, DVD, Register
- 4 a) Define two classes of software. Given below a list of software. Identify which type each software belongs to. (3)

Antivirus	Mac OS	PowerPoint	iDOS	Linux
Registry Cleaner	Windows	Firewall	Screen Saver	MS Excel

b) What is programming language? What are the benefits of high-level language over machine language? (3)
c) What do you mean by 'source code' and 'object code'? Explain with example. (3)
d) What is flowchart? Draw the basic symbols and their meanings used in a flowchart. (3)
- 5 a) What is algorithm? What are the criteria of an algorithm? (3)
b) Consider the following algorithm for reversing an integer number: (4)

```
Declare a variable n, reverse and remainder as integer;  
Read the number n;  
while n not equal 0  
{  
    remainder=n%10;  
    reverse=reverse * 10 + remainder;  
    n=n/10;  
}
```

- Draw the flowchart for the above-mentioned algorithm.
- c) Write down the differences between Compiler and Interpreter.
- d) What is information system? Distinguish between a computer, a computer program, and an information system.
- 6 a) Which number systems are used in digital technology? 'Octal number system has a base of 8' - what does it mean? (2)
- b) How many unique numbers can be constructed using 10 bits? What are the next three hexadecimal numbers following EEF? (2)
- c) Convert the following numbers into the number system specified: (4)
 - i) 127_{10} =Binary
 - ii) 1010101_2 =Decimal
 - iii) $3D9F_{16}$ =Octal
 - iv) 10101110_2 =Hexadecimal
- d) How many complements are there in binary number system? Perform the binary subtraction of the following two numbers using 2's compliment method: $11101 - 01101 = ?$ (4)
- 7 a) Draw a circuit which corresponds to the following truth table using only AND, OR and NOT gates. (3)

Inputs		Output
a	b	z
0	0	1
0	1	0
1	0	0
1	1	1

- b) Construct a logic circuit for the following Boolean expression: (3)

$$\overline{A} \cdot \overline{B} + C \cdot D + \overline{E} \cdot F$$

- c) What is meant by universal gate? Construct the logic circuit of AND gate and OR gate using only NAND gate. (1+3)
- d) Write down the function of the following registers: (2)
 - i) Program Counter (PC)
 - ii) Memory Address (MAR)

**Institute of Information Technology
Jahangirnagar University
BSc in Information and Communication Technology
1st Year 1st Semester Examination 2021**

Course Code: ICT-1103

Time: 3 hours

Course Title: Structured Programming

Full Marks: 60

Answer any FIVE Questions

1. a) Define high-level, mid-level, and low-level languages in terms of programming. 3
b) Write the basic differences between Compiler and Interpreter. 2
c) Write down the steps of execution for a C program. What are the roles of Compiler and Linker in the execution process? 4
d) Find the valid variable names from the followings: (Mention the reason for invalid names). 3
 - i. var-new
 - ii. new_var
 - iii. 123count
2. a) Write a C program sudo code to read an English Alphabet through keyboard and display whether the given Alphabet is in upper case or lower case. 5
b) Explain how one can use the built-in function in C, scanf() to read values of different data types. Also explain using examples how one can use the built-in function in C, printf() for text formatting 4
c) Identify the errors in the following C code and write down the correct program. 3

```
#include<stdio.h>
int main()
{
    float radius, perimeter;
    printf ("Enter the Radius of Circle:\n");
    scanf ("%d", &radius);
    perimeter=2*3.1416*r
    printf ("perimeter = %d\n", a);
}
```

3. a) Write a C program to read a Natural Number through keyboard and to display the reverse of the given number. For example, if "3214567" is given as input, the output to be shown is "7654123". 4
b) Explain how characters and floating point numbers are stored in memory and processed in C. 4

- c) Considering the following declaration part of a C program describe the memory concept of each line.
- i. int a, b, sum;
 - ii. a = 10;
 - iii. b = 20;
 - iv. sum = a + b;
4. a) Without using any built-in string processing function like `strlen`, `strcat` etc., write a program to concatenate two strings. 4
- b) Write a function namely `myFact()` in C to find the factorial of a given number. Also, write another function in C namely `nCr()` which accepts two positive integer parameters `n` and `r` and returns the value of the mathematical function, $C(n, r) = \frac{n!}{r!(n-r)!}$. The function `C(n, r)` is expected to make use of the factorial function `myFact()`. 4
- c) How does a recursive function work? Explain with an example. 4
5. a) What is a Multidimensional Array? How do you declare and initialize a multidimensional array in C? Give examples. 4
- b) Find out the errors in the following code (if any) and show the output after correction. 4
- ```
#include<stdio.h>
#include<string.h>
void main()
{
 char a1[10] = "Happy";
 char a2[10] = "Exam";
 int i;
 a = strcat (a1, a2);
 printf ("String s1 is: %s\n", a1);
 if (strcmp (a1, "Good") == 0)
 printf("Output result: %s\n", strlwr(a2));
 else
 printf("Output result: %s\n", strrev(a1));
 i = strlen (a);
 printf("Length of s1+s2 is: %d\n", i);
}
```
- c) Define pointer. How do you access an array using pointers? Explain with an example. 4
6. a) With a suitable example, explain the concept of pass by reference. 4
- b) With a suitable example, explain how pointers can help in changing the content of a single dimensionally array passed as an argument to a function in C. 5
- c) What are the advantages of structure over array? 3

7. a) Differentiate between sequential files and random access files? 4
- b) Using the prototypes explain the functionality provided by the following functions.  
fseek() 2) ftell() 3) fread() 4) fwrite() 5) fgets() 4
- c) Briefly explain call by value and call by reference in a user-defined function with proper examples. 4

**Institute of Information Technology  
Jahangirnagar University  
BSc in Information and Communication Technology  
1st Year 1st Semester Examination 2021**

**Course Code:** ICT-1105  
**Course Title:** Electrical Circuits

**Time:** 3 hours  
**Full Marks:** 60

**Answer any FIVE Questions**

1. a) How much energy does a 100-W electric bulb consume in two hours?  
b) Calculate the equivalent resistance  $R_{ab}$  in the circuit in Figure 1.1.

3  
6

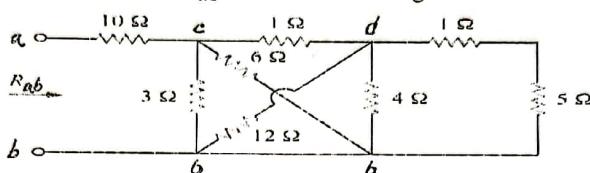


Figure 1.1

- c) State KVL and KCL with suitable illustrations.  
2. a) Find  $i_o$  from the circuit in the Figure 2.1. Use superposition theorem for solving this problem.

3  
6

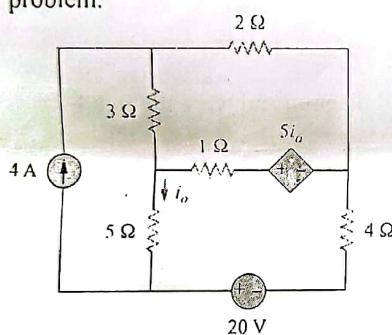


Figure 2.1

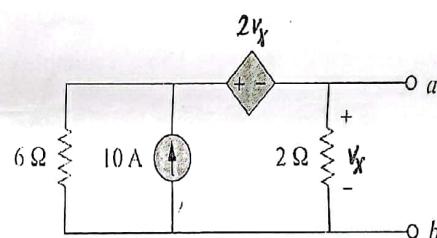


Figure 2.2

- b) Find the  $R_N$  and  $I_N$  of the circuit in Figure 2.2.  
3. a) Deduce the current and voltage expression for the source free RC circuit. Also show the effect of time constant on the voltage response curve.  
b) Consider the circuit in Figure 3.1. Under dc conditions, find: (a)  $i$ ,  $v_c$ ,  $i_L$ , (b) the energy stored in the capacitor and inductor.

6  
6  
6

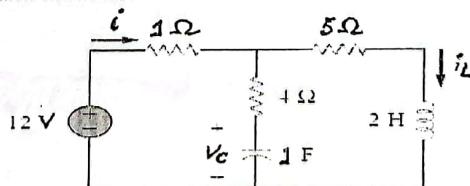


Figure 3.1

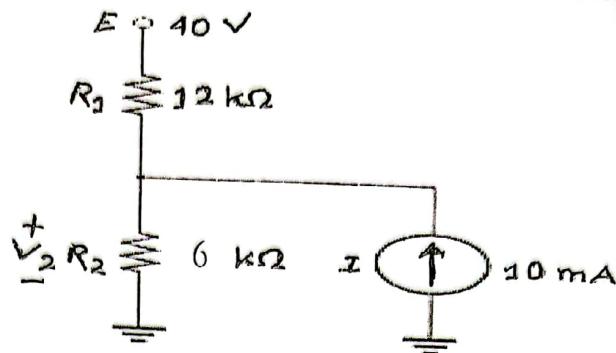
4. a) For the following pairs of voltages and currents, indicate whether the element involved is a capacitor, an inductor, or a resistor, and find the value of C, L, or R if sufficient data are given:  
i)  $v = 550 \sin(377t + 50^\circ)$

$$i = 11 \sin(377t - 40^\circ)$$

$$ii) v = 36 \sin(754t - 80^\circ)$$

$$i = 4 \sin(754t - 170^\circ)$$

- b) Applying superposition, calculate the voltage  $V_2$  for the following network.



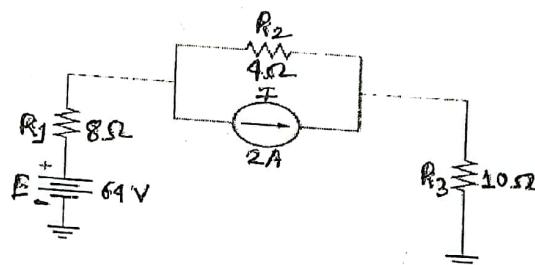
- c) Prove that,

$$I_{dc} = \frac{I_m}{\sqrt{2}} = 0.707 I_m$$

5. a) Derive the equation for the average or real power of an AC circuit. Also, determine the power for pure resistive, inductive and capacitive networks.  
b) Apply nodal analysis to the network in figure below:

4

6



6. a) State Thevenin's theorem. Draw a suitable circuit diagram and write the step-by-step procedure.  
b) Find  $i_x$  in the circuit of Fig. 6.1 using nodal analysis.

4

8

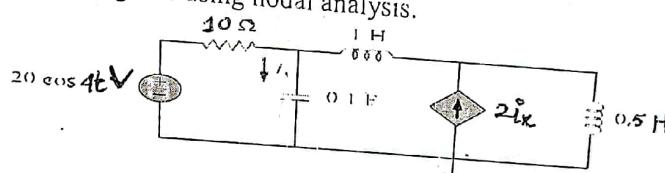


Figure 6.1

7. a) Find the rms value of the current waveform of Figure 7.1. If the current flows through a 9Ω resistor, calculate the average power absorbed by the resistor.

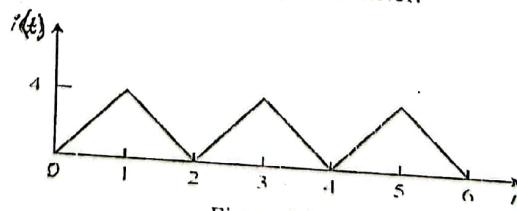


Figure 7.1

- b) Prove that,

- i) For maximum average power transfer, the load impedance  $Z_L$  must be equal to the complex conjugate of the Thevenin impedance  $Z_{Th}$   
ii)  $P_{max} = \frac{|V_{Th}|^2}{8R_{Th}}$

7

Institute of Information Technology  
Jahangirnagar University, Savar, Dhaka  
1<sup>st</sup> Year 1<sup>st</sup> Semester B.Sc. Final Examination 2021

Course Code: IT-1107  
Total Marks: 60

Course Title: Physics  
Times: 3 Hours

Answer any five (5) questions:

1. a) What are the basic assumptions of the kinetic theory of gases? 3  
b) Deduce the equation of state of an ideal gas:  $PV=nRT$ , where the symbols have their usual meanings. 5  
c) Deduce the expression for work done during an adiabatic process of an ideal gas. Draw the P-V diagram. 4
2. a) State and explain Zeroth law of thermodynamics. 5  
b) What is temperature? Discuss different temperature scales. 4  
c) What is heat capacity and specific heat capacity? 3
3. a) What is isobaric and isochoric process? 2  
b) Derive the expression for word done by an ideal gas during an isothermal process. 4  
c) Explain Carnot's cycle. Deduce an expression for works done by the Carnot engine per cycle. 6
4. a) What are coherent sources? Explain its importance in interference of light? 2  
b) From Young's interference experiment establish the conditions for maxima and minima and derive the expression for intensity. 6  
c) A viewing screen is separated from a double-slit source by 1.2m. The distance between the two slits is 0.030mm. The second order bright fringe ( $m=2$ ) is 4.5cm from the center line.
  - i. Determine the wavelength of the light. 4
  - ii. Calculate the distance between adjacent bright fringes. 2
5. a) What is diffraction of light. 2  
b) Derive an expression for the width of central maximum for diffraction due to a single slit. 6  
c) A screen is placed 2m away from a narrow slit which is illuminated with light of wave length  $6000 \text{ } \text{\AA}$  if the first minimum lies 5mm on either side of central maximum. Calculate the slit width. 4
6. a) Define the term simple harmonic motion. Write down the characteristics of simple harmonic motion. 3  
b) Derive the differential equation of simple harmonic oscillation. 5  
c) The time period of an object executing simple harmonic motion is 0.001s and its amplitude is 0.005m. Calculate its acceleration at 0.002m from the midpoint of the motion. 4
7. a) Define the polarization of light. 2  
b) Discuss the polarization by reflection and prove the Brewster law. 5  
c) Describe the Nicol prism and explain how it can work as analyzer and polarizer? 5



**Institute of Information Technology  
Jahangirnagar University**

1<sup>st</sup> Year 1<sup>st</sup> Semester B.Sc.(Hons.) Final Examination, 2021

Course Code: ICT-1109

Course Title: Differential and Integral Calculus

Total Marks: 60

Time: 3 Hours

Answer any five (5) from the following questions. Figures at the right indicate the marks.

1. (a) Graph the following functions and determine their domains and ranges. 6

(i)  $f_1(x) = a^x - 1$ , (ii)  $f_2(x) = \frac{1}{\sqrt{(-x+4)}}$ , (iii)  $f_3(x) = \cos x$ , (iv)  $f_4(x) = 1 - \sqrt{-x-1}$ .

(b) Let  $f(x) = \begin{cases} 1, & \text{when } x < 0 \\ 1 + \sin x, & \text{when } 0 \leq x < \frac{\pi}{2} \\ 2 + \left(x - \frac{\pi}{2}\right)^2, & \text{when } x \geq \frac{\pi}{2} \end{cases}$ . Does  $\lim_{x \rightarrow 0} f(x)$  exist? 6

Determine whether  $f'(x)$  is continuous and differentiable at  $x = \frac{\pi}{2}$ . Then, find the derivative  $f'(x)$  at  $x = \frac{\pi}{2}$ .

$$f'(x) \text{ at } x = \frac{\pi}{2}.$$

2. (a) If  $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots}}}$  then, show that,  $\frac{dy}{dx} = \frac{\cos x}{2y-1}$ . 3

(b) Differentiate  $(\tan x)^{\cot x} + (\cot x)^{\tan x}$  with respect to  $x$ . 3

(c) If  $u = \ln r$  and  $r^2 = x^2 + y^2 + z^2$  then show that,  $r^2 \left( \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) = 1$ . 3

(d) At what rate is the volume of a box changing if its length is 8 ft and increasing at 3 ft/sec., its width is 6 ft and increasing at 2 ft/sec. and its height is 4 ft and increasing at 1 ft/sec.? 3

3. (a) Explain the Leibniz's theorem. 2

(b) If  $y^{\frac{1}{m}} + y^{-\frac{1}{m}} = 2x$ , show that, 5

i.  $(x^2 - 1)y_2 + xy_1 - m^2y = 0$

ii.  $(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$  5

- (c) What is Rolle's Theorem?

Verify the Rolle's Theorem for  $f(x) = 2x^3 + x^2 - 4x - 2$  over  $[-\sqrt{2}, \sqrt{2}]$

4. (a) Form into an Echelon matrix of the given matrix A

$$A = \begin{vmatrix} 1 & -2 & 1 & 0 \\ 0 & 2 & -8 & 8 \\ -4 & 5 & 9 & -9 \end{vmatrix}, \quad B = \begin{vmatrix} 1 & 2 & -3 & -2 & -3 \\ 1 & 3 & -2 & 0 & -4 \\ 3 & 8 & -7 & -2 & -1 \\ 2 & 1 & -9 & -10 & -3 \end{vmatrix}, \quad C = \begin{vmatrix} 2 & -1 & -1 \\ 1 & -2 & 1 \\ 1 & -1 & 2 \end{vmatrix}, \quad D = \begin{vmatrix} 1 & -1 \\ 2 & -1 \end{vmatrix}$$

(b) What do you mean Rank of a Matrix? Find the Rank of a matrix B.

(d) Find the Eigen values and associated Eigen vectors of the matrix D.

5. (a) Identify the intervals on which  $f(x) = x^4 - 4x^3 + 10$  is increasing, decreasing, concave up and concave down. Find the critical points, inflection points, maximum and minimum values, if any, of  $f(x)$ . Then using the above information graph the function  $f(x)$ .

(b) State Mean Value Theorem. Justify the theorem for the function  $f(x) = x^2 + 2$  in the interval [1,2].

6. (a) Prove that,  $\int_0^{\pi/2} \sin^m x \cos^n x dx = \frac{\Gamma\left(\frac{m+1}{2}\right) \Gamma\left(\frac{n+1}{2}\right)}{2\Gamma\left(\frac{m+n+2}{2}\right)}$

(b) Find the integral value of  $\int_0^1 \sqrt{x^5}(1-x) dx$ .

(c) Prove that  $\int_{-a}^a f(x) dx = \begin{cases} 0, & \text{when } f(x) \text{ is odd} \\ 2 \int_0^a f(x) dx, & \text{when } f(x) \text{ is even} \end{cases}$

(d) Find the value of  $\lim_{n \rightarrow \infty} \left[ \frac{n+2}{n^2+1} + \frac{n+4}{n^2+4} + \frac{n+6}{n^2+9} + \dots + \frac{n+2n}{n^2+n^2} \right]$ .

7. (a) Find the area of the region enclosed by the curves,  $y=x^2$  and  $y=x+5$ .

(b) Find the whole length of the cycloid,  $x=a(\theta+\sin\theta)$ ,  $y=a(1-\cos\theta)$ .

(c) Find the volume of the solid generated by revolving the ellipse,  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  about x-axis.



## Institute of Information Technology Jahangirnagar University

1<sup>st</sup> Year 1<sup>st</sup> Semester B.Sc.(Hons.) Final Examination, 2021

Course Code: ICT-1111

Course Title: Communicative English

Total Marks: 60

Time: 3 Hours

Answer any five (5) from the following questions. Figures at the right indicate the marks.

1. Read the passage carefully and answer the following questions.

(6×2=12)

By partaking in social networking sites, you are opening yourself up to cyberbullying. Even though there might be a number of good people out there, there are also a lot of bad people as well. While you might be trying to connect with people who share the same interests, someone else might be out there to tear you down and make you feel like less of an individual. Cyberbullying is huge and isn't something that anyone should have to deal with, but it happens all the time.

Social networks can also cause people to feel bad about themselves. You might see someone who is younger than you with more things than what you have, thus causing you to feel insecure about who you are and what you have accomplished in life. Even though you might not know that person's history, that doesn't make it any less traumatizing.

There is also the chance that someone could go online and post an inappropriate picture of you that is taken out of context. What might seem innocent enough soon becomes the main focus of everyone's jokes and harassment toward you. You cannot control what other people post online. Even though you can fight it, you end up spending a lot of your time stressing out over what is going to appear online next. That's when you have to ask yourself if it is really worth in the end.

While no one can say for sure whether social networking is a boon or a bane, it will continue to be a pivotal part of society. Even though one person might benefit from it greatly, another person could end up being hurt by it. There is no way to know which way it is going to go because everyone has their own perception of social networking and the benefits or drawbacks that it brings to the table. Only you can decide whether you think social networking is a boon or a bane.

- a. What is the main argument of the passage?
  - b. What is the writer's opinion about the function of a social network?
  - c. Does the tone of the writer change at any point? When?
  - d. What does the word 'pivotal' mean in the passage?
  - e. To what extent, do you agree with the writer?
  - f. What could be the title of the passage?
- 
2. a. The following job advertisement is found in The Daily Star dated 25<sup>th</sup> July, 2022. Assume that the requirements needed to apply for the posts of officers are quite identical to the achievements, skills, and experiences you have. Now, read the following advertisement carefully and write a cover letter in response to it.

6

## CAREER OPPORTUNITY

**Eusebio Textile (Bangladesh) Ltd.**, declares Vacancy for the following Posts :

1. Commercial Officer
  2. Purchase Officer
  3. HR Officer
  4. Lab Test Person [Vacancy: 5 Persons]
  5. R & D Technician [Vacancy: 5 Persons]
  6. Interpreter [Chinese to Bengali]

***Required Qualifications***

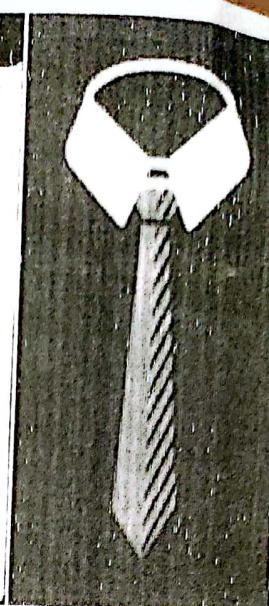
- # **Officer** Graduate, Fluent speaking & writing in English, Computer literacy
  - # **Lab Test Person** Graduate, at least 3 years experience on the similar post, Fluent speaking & writing in Chinese
  - # **R & D Technician** Graduate, at least 3 years experience on the similar post, Fluent speaking & writing in Chinese
  - # **Interpreter [Chinese to Bengali]** : Graduate, Fluent speaking & writing in Chinese & Bengali

**Send your resume with Qualifications within 10 days to  
HR Dept.**

HR Dept.  
Eusebio

**Eusebio Textile (Bangladesh) Ltd.**  
Plot No. # 150-156, 181-182, Sector-10, Dhaka-1205

150-156, 181-183, Comilla BPZ, Comilla-3500



- b. One of your intimate friends invites you to join the party of his/her marriage anniversary on coming Sunday. You accepted the invitation earlier, but your boss knocks you today to attend an urgent official meeting on the same date. Now, refuse the invitation of your friend developing an email body.

- 6

3. The following figure stands as the map of Marine city where Joseph, a middle class fellow resides in the Canton Colony without having any personal vehicle(s). He intends to move to the court today from his home. The city highways only allow buses, taxis, and personal cars where the other roads allow rickshaws, taxies, and personal cars only. Busses cost tk. 2/km in the city, whereas the rickshaws and the taxies cost tk. 20 and tk.30 per kilometer respectively. Describe the possible ways Joseph can take to reach his destination. Offer your opinion to make a compatible move for Joseph in terms of vehicles, time, comfort, and costs.

- 12

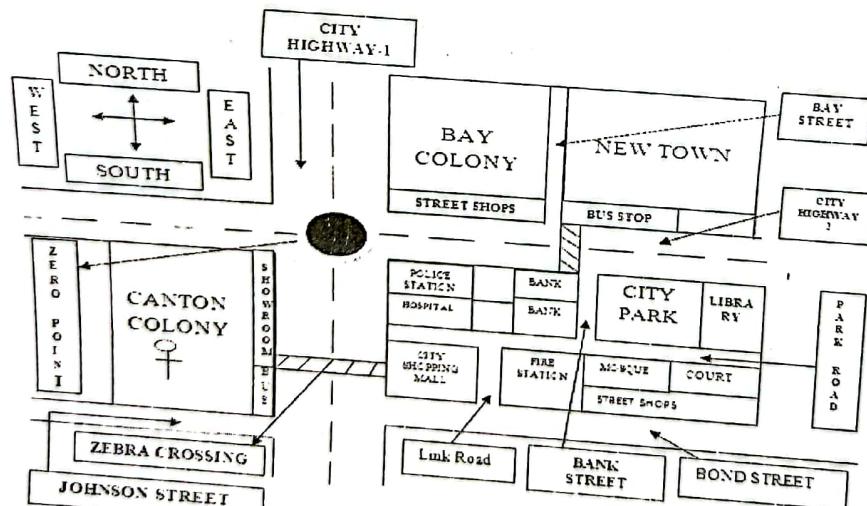


FIGURE: MAP OF MARINE CITY

4. Fill in the gaps with the right forms of verb/ preposition.

- a. Much as Rome built roads through Europe in the years of the Roman Empire,  
British built Railways and strung telegraph wires in India.

b. I cannot help helping her.

c. If he had worked hard, he will get the promotion.

d. X: How long did you stay at the party yesterday night? Y: I AM.

- 2

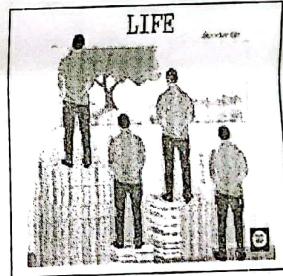
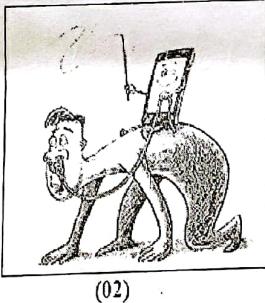
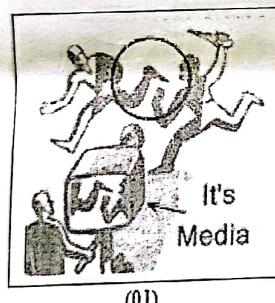
- 1

- 2

- e. Output at the plant went down by almost 40 percent    the strike. 1
- f. I'm shifting to a new locality    summer. 1
- g. Long ago there was (a) – emperor in (b) --- China. He increased (c) — taxes very severely. 2

Write the meaning of the bold idioms and phrases:

- h. The government of the nations is not **hard and fast** with the lockdown rules during pandemic disease. 1
- i. The Principal was **up in arms** when he heard that boys had fought over a room sharing in the hostel. 1
5. a. Suppose you have collected your all certificates from the university. One day suddenly you have noticed that there is a spelling mistake in your name. Write an application to the Exam Comptroller of your university for making the necessary correction in the certificate and reissue it. 6
- b. Suppose you want to buy a laptop from a computer shop with some specifications. Write a dialogue between you and the sales man for purchasing a laptop from the shop. 6
6. a. Read the following visual texts carefully and give possible interpretations for any two based on your reading. You are free to interpret as you wish but the interpretations must have logical grounds. 7



(01)

(02)

(03)

5

- b. (i) A stranger says to you, "How do you do?"  
 (ii) Your boss visits your home. Introduce your boss with your younger brother.  
 (iii) A stranger is knocking at your door in the early morning.  
 (iv) After a sudden visit to your home, your relatives are leaving you.  
 (v) Your sister is affiliated for a full bright scholarship in a European university.
7. a. A paragraph with all its' four parts: the introducer (introduces the main idea to the audiences), the developers/ supporting details (support the idea with logics, evidences, information), the context modulators (help to switch the mood of the narrator by connecting the contexts well), and the terminator (summarizes the idea in light of the ascription made with the introducer) offers a graphic description of a single idea. Take the pain to mind-map on "The Importance of Communicative English" and develop the idea within a 150-word paragraph. 7
- b. Read the following passage carefully and rewrite it with grammatically well formed sentences. 5

Being admitted in the Institute of Information Technology at Jahangirnagar University, Noyon moved to the residential hall he is allotted to. He had been travelling over three hundred kilometers from dawn to dusk that day. As he moved away from home for long, his mother managed and cooked and packed his favorite dishes so carefully. Neither he nor his roommates were thoughtful about the dishes. Wear and tear has to be

expected when one goes through excitement and nervousness. As corned beef and cabbage was his favorite dish of all time, he couldn't but blame his luck repeatedly. After few days passed with friends, everything became normal to him. Noyon, as a down to earth boy has always been in a positive move toward life. He cares his study as he does for his dreams. A new chase to prove his worth.