

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Mechatronics Engineering

B. Sc. Engineering 1st Year 2nd Term Examination, 2020

CSE 1231

(Computer Programming)

Time: 1 Hour 30 Minutes

Total Marks: 120

- N.B.:** i) Answer any TWO questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if any missing.

SECTION-A

1(a) What is meant by 'top-down programming'? What are its advantages? How is it carried out? 10

1(b) Determine the purpose of each of the following C programs. Identify all variables, all input and output statements, all assignment operators, and any other special features that you recognize. 10

(i)

```
main( )
{printf("Welcome to the wonderful world of
Computing!\n");}
```

(ii)

```
main( )
{float gross, tax, net;
printf (Gross salary:");
scanf (%f, & gross);
tax=0.14 x gross;
net=gross - tax;
printf ("Taxes withheld:%0.2f\n",tax);
printf ("Net salary:%0.2f",net);}
```

1(c) Write down the output of the following program: 10

```
short int b = - 4000;
unsigned short int C = - 2000;
printf("value in b = %hi\n",b);
printf("value in c = %hu\n",c);
printf("value in b = %f\n\n",b);
printf("value in c = %hi\n\n",c);
```

2(a) What is the basic difference between keyword and identifier? Write down the rules for naming identifiers. 10

2(b) Write a program that simulates a log-on to a remote system. The system can be accessed only if the user knows the password, which in case is "KUETMTE". If the user succeeds, simply print "Log-on Successful" and exit. If the user fails, then display "Access Denied" and exit. 10

2(c) Write down the output of the program: 10

```
int z, x = - 3, y = 3;
z = x - - + y - -;
printf("x=%d y=%d z=%d\n", x, y, z);
z = - - x + - - y ;
printf("x=%d y=%d z=%d\n", x, y, z);
z = x + + - - - y ;
printf("x=%d y=%d z=%d\n", x, y, z);
z = - - x + + + y ;
printf("x=%d y=%d z=%d\n", x, y, z);
```

- 3(a) What is pseudocode? What advantage is there in using pseudocode to plan a new program? Draw the symbols used to define a flow chart and write their functions. 10
- 3(b) What is function prototype? What are the benefits of it? 10
- 3(c) If $c = 2868732$, show the output of the program: 10

```
#include <stdio.h>
Int main( )
{int a, d, p, *b, *c, r=9;
  c = &r;
  d = &c;
  p = *c;
  b = c;
  printf("%d\n", *b);
  printf("%d\n", *(int*)*(int*)d);
  printf("%d\n", *(int*)d);}
```

SECTION-B

- 4(a) What is the purpose of 'for' statement? How does it differ from 'while' statement and 'do-while' statement? How many times will a 'for' loop be executed? Compare with the 'while' loop and 'do-while' loop. 10
- 4(b) Print the following output using C program. 10
- ```
1
2 1
3 2 1
4 3 2 1
```
- 4(c) Write a program to check whether a number is a palindrome or not. 10
- 5(a) What is structure? Explain methods to declare structure and initialize structure variable with example. 10
- 5(b) Write a switch statement that will examine the value of a char-type variable called color and print one of the following messages, depending on the character assigned to color. 10
- (i) RED, if either r or R is assigned to color,
  - (ii) GREEN, if either g or G is assigned to color,
  - (iii) BLUE, if either b or B is assigned to color,
  - (iv) BLACK, if color is assigned any other character.
- 5(c) Write a program to determine if a calendar year is a Leap Year or not. 10
- 6(a) Write a C program to accept an array of 10 elements and swap 3rd element with 4th element. Use a function for the purpose of swapping. 10
- Test data:  
 Input array elements: 1 5 6 7 1 8 5 3 6 4  
 Expected output: 1 5 7 6 1 8 5 3 6 4
- 6(b) What is recursive function? Discuss call by value and call by reference. 10
- 6(c) What is file? Describe basic file operations with appropriate syntax and example. 10

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

**Department of Mechatronics Engineering**

B. Sc. Engineering 1st Year 2nd Term Examination, 2020

Hum 1231

(Technical and Communicative English)

Time: 1 Hour 30 Minutes

Total Marks: 120

- N.B.:** i) Answer any TWO questions from each section in separate scripts.  
ii) Figures in the right margin indicate full marks.

**SECTION-A**

- 1(a) Make sentences with the following structures using the words given in brackets 10
- (i) Subj. + Liking verb + Noun Complement. (Be verb as verb)
  - (ii) Subj. + Intransitive verb + Adv. of manner. (Sleep as verb)
  - (iii) That + Subj. + Verb + Adv. of manner + Verb + Adj. complement. (Work and is as verb)
  - (iv) Not only + Subj. + but also + Subj. + Verb + Adv. (Play as verb)
  - (v) Subj. + Verb + Adv. + So that + Subj. + Verb + Adv. of place. (Work and enrich as verb).
- 1(b) Change the following words as directed and make sentences with the changed words 10
- (i) Filter (into Adjective), (ii) Exploration (into Verb),
  - (iii) Devote (into Noun), (iv) Owner (into Verb), (v) Possess (into Noun).
- 1(c) Make use of the following modals in sentence as asked in brackets 10
- (i) May. (To approve somebody for something)
  - (ii) Could. (To express past ability)
  - (iii) Must. (To express certainty)
  - (iv) Had better. (To express an action which is proper to do)
  - (v) Should. (To express propriety for somebody else).
- 2(a) Make Wh question with the underlined words of the following sentences. 10
- (i) Soma speaks English frequently.
  - (ii) Sonali is five feet and two inches tall.
  - (iii) The bus runs at a speed of forty kilometers per hour.
  - (iv) The pond is ten feet deep.
  - (v) He discussed the difficulty of studying abroad.
- 2(b) Make use of the following words in sentence as asked in brackets. 10
- Bed (as verb); Access (as adjective); Hand (as verb); Baby (as verb); Love (as adjective).
- 2(c) Complete the following sentences with clause as asked in brackets. 10
- (i) \_\_\_\_\_ is praiseworthy. (Noun clause)
  - (ii) We know \_\_\_\_\_ . (Noun clause)
  - (iii) \_\_\_\_\_ , he can progress in life. (Adv. clause)
  - (iv) \_\_\_\_\_ , he can't do well in exam. (Adv. clause)
  - (v) Rabu, \_\_\_\_\_ , is a student. (Adj. clause)
- 3(a) Transform the following sentences as instructed below 10
- (i) She finished her daily job and went home. (Simple)
  - (ii) He bought his uncle's property. (Complex)
  - (iii) The news that enemy landed spread like wildfire. (Simple)
  - (iv) He died in his native village. (Complex)
  - (v) If you go to King's Landing, you will find the Iron Throne interesting. (Compound)

- 3(b) Correct the following sentences. 10
- (i) President is supposed to preside over the meeting.
  - (ii) When he is ill, he will not come in class.
  - (iii) He has little books.
  - (iv) We met his elder.
  - (v) She likes her son.
- 3(c) Express the following notions/ functions in sentence. 10
- (i) Boredom, (ii) Patience, (iii) Determination, (iv) Wish, (v) Pains.

### SECTION-B

- 4(a) Read the following passage carefully and answer the questions that follow: 18
- Let's think and feel all of a family, Society, Country etc. We only then can have a world – selfishness free world where a human being instead of own things, can sacrifice for the interest of any other human beings. This is a world of sacrifice, not egocentric. This is the self, - Kazi Nazrul Islam, Walt Whitman and other noble hearted human beings nurture. Walt Whitman in 'Song of Myself' says 'I believe in you my soul'. This enriched self alleviates the dimension of hungry, poverty, disease, unwanted death, greediness, social unrest, darkness remaining in self, etc. These cruel forces that affect the life of several human beings living all over the world, must be immediately eliminated. Otherwise, the people of the world must undergo a terrible situation in their life. Particularly those, who are victim to the cruel forces – enemy to humans, feel silently, their hearts bleed without sound, they imagine of another world – those cruel forces free world. Therefore, Jibananda Das sings in 'Adbudh Adhar Ek Esesa Aj' that it is essential to evaluate so hearts of human beings nourishing dignity, honesty, values, art, etc. and human beings should not be hawks and fox.
- (i) How do we have the world of sacrifice?
  - (ii) What corrode an enriched self of several humans?
  - (iii) How do some human beings suffer because of cruel forces – enemy to humans?
- 4(b) Make a precis of the above written passage (Q. 4(a)) with a suitable title. 12
- 5(a) Write a paragraph on online education in Bangladesh and give it a suitable title. 15
- 5(b) Write a letter to your friend about your quarantine days of 2020. 15
- 6(a) What is the nature of love as is seen in 'Of Love' according to Francis Bacon? 10
- 6(b) What education does a traveler achieve in travel as Francis Bacon presents in 'Of Travel'? 10
- 6(c) Delineate the character of Jim and Della as you see in 'The Gift of the Magi' by O'Henry. 10

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Mechatronics Engineering**

B. Sc. Engineering 1st Year 2nd Term Examination, 2020

Math 1231

(Vector, Matrix and Ordinary Differential Equation)

Time: 1 Hour 30 Minutes

Total Marks: 120

**N.B.:** i) Answer any TWO questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

iii) Assume reasonable data if any missing.

**SECTION-A**

- 1(a) Let  $\phi = x^2yz - 4xyz^2$ . Find the directional derivative of  $\phi$  at  $P(1, 3, 1)$  in the direction of  $2\hat{i} - \hat{j} - 2\hat{k}$ . 12
- 1(b) Suppose  $\vec{A} = (3x^2 + 6y)\hat{i} - 14yz\hat{j} + 20xz^2\hat{k}$ . Evaluate  $\int_C \vec{A} \cdot d\vec{r}$  from  $(0, 0, 0)$  to  $(1, 1, 1)$  along the following paths C: 18
- (i)  $x = t, y = t^2, z = t^3$
- (ii) the straight lines from  $(0, 0, 0)$  to  $(1, 0, 0)$  then to  $(1, 1, 0)$ , and then to  $(1, 1, 1)$ .
- 2(a) What does divergence of a vector field measure? Is it true  $\vec{\nabla} \cdot \vec{F} = \vec{F} \cdot \vec{\nabla}$ ? Why or why not? If not interpret the symbol  $\vec{F} \cdot \vec{\nabla}$ . 15
- 2(b) Is the vector field,  $\vec{A} = (y^2 + 2xz^2 - 1)\hat{i} + 2xy\hat{j} + 2xz^2\hat{k}$  irrotational? If so, find its scalar potential. 15
- 3(a) Evaluate  $\oint [(x^2 - 2xy)dx + (x^2y + 3)dy]$  around the boundary of the region defined by  $y^2 = 8x$  and  $x = 2$ . 15
- 3(b) Evaluate  $\int_S \vec{F} \cdot \hat{n}dS$ , where  $\vec{F} = y\hat{i} + 2x\hat{j} - z\hat{k}$  and  $S$  is the surface of the plane  $2x + y + 2z = 6$  in the first octant. 15

**SECTION-B**

- 4(a) Find the inverse of the matrix using adjoint matrix. 16
- $$\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$$
- 4(b) Find the rank of the matrix. 06
- $$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$$
- 4(c) Solve the following system of linear equations: 08
- $$\begin{aligned} x_1 + 2x_2 - 3x_3 &= -1 \\ 3x_1 - x_2 + 2x_3 &= 7 \\ 5x_1 + 3x_2 - 4x_3 &= 2. \end{aligned}$$

5(a) Solve:  $4y'' + 36y = \operatorname{cosec}3x$ . 15

5(b) Solve:  $(D^2 - 2D + 4)y = e^x \cos x + 2$ . 15

6(a) Find a particular solution of  $y'' - 4y' + 5y = 3$  when  $y(0) = 2$  and  $y'(0) = 4$ . 15

6(b) Solve:  $x^2y'' - 3xy' - 5y = x^2$ . 15

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Mechatronics Engineering

B. Sc. Engineering 1st Year 2nd Term Examination, 2020

ME 1231

(Manufacturing Processes)

Time: 1 Hour 30 Minutes

Total Marks: 120

**N.B.:** i) Answer any TWO questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

**SECTION-A**

- 1(a) What is meant by manufacturing processes? Why it is important in mechatronics engineering? 08
- 1(b) Enumerate some common casting defects and explain the reasons which cause these defects. 10
- 1(c) Why chills are used in metal casting? Discuss different types of chills. 12
- 2(a) Explain with neat sketch the principle of extrusion. 10
- 2(b) What happens during rolling on grain refinement? Explain various roll arrangements used in rolling mills. 12
- 2(c) How does electrode covering act as arc stabilizer? Why does a high carbon equivalent reduce the weldability of steel? 08
- 3(a) How can flux be cleaned off of joint after brazing? 05
- 3(b) How large manufacturing companies got benefited using robotic welding technology? Discuss briefly. Write down the differences between forging and extrusion. 15
- 3(c) Explain the advantages and disadvantages of TIG welding. 10

**SECTION-B**

- 4(a) Why metal removal processes are important in manufacturing? Draw a single point cutting tool and label it. 10
- 4(b) What are the functions of cutting fluid? Prove that  $\tan\phi = \frac{r\cos\alpha}{1-r\sin\alpha}$ , where  $\phi$  is the shear angle,  $r$  is the cutting ratio and  $\alpha$  is the rake angle. 10
- 4(c) Explain different types of chips with necessary sketches. Why chip breaker is used? 10
- 5(a) What are the importances of machining process? Explain different types of turning operation with neat sketches. 12
- 5(b) Make a sketch of an engine lathe and label its main parts. What are the functions of chuck? 10
- 5(c) What are the differences between shaper and planer machine? Describe quick return mechanism with neat sketch. 08
- 6(a) What are the differences between conventional and nonconventional machining? Describe the working procedures of EDM with neat sketch. 12
- 6(b) What is meant by CNC machine tool? Describe the axes configuration system of CNC vertical milling machine. 08
- 6(c) What are the processes for plastic products? Describe the injection molding process with neat sketch. 10

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

Department of Mechatronics Engineering

B. Sc. Engineering 1st Year 2nd Term Examination, 2020

Ph 1231  
(Physics)

Time: 1 Hour 30 Minutes

Total Marks: 120

- N.B.:** i) Answer any TWO questions from each section in separate scripts.  
ii) Figures in the right margin indicate full marks.  
iii) Assume reasonable data if any missing.

**SECTION-A**

- 1(a) Applying Gauss's law find an expression for electric field at a point inside a uniformly charged sphere. 12
- 1(b) What is the function of a dielectric material in the case of a capacitor? 08
- 1(c) Two-point charges of magnitude  $3.0 \times 10^{-7}$  coul and  $5 \times 10^{-7}$  coul are 12 cm apart. What is the field intensity of each charge at the site of the other? 10
- 2(a) Current density is a vector quantity but current is not. Explain it. 06
- 2(b) State loop rule and junction rule. Applying Kirchhoff's law show that  $\frac{P}{Q} = \frac{R}{S}$ . 14
- 2(c) A copper wire of  $3.0\text{mm}^2$  cross-sectional area carries a current of 5.0A. Find the magnitude of the drift velocity for the electrons in the wire. 10
- 3(a) Discuss briefly the distinguishing features of diamagnetic, paramagnetic and ferromagnetic substances. 10
- 3(b) Show that current density and drift velocity are related by the relation  $\vec{j} = -ne\vec{V}_d$ ; where symbols have their usual meanings. 10
- 3(c) A copper wire is 20m long and 0.245mm in diameter. Compute its resistance. Resistivity of copper is  $1.7 \times 10^{-8} \Omega\cdot\text{m}$ . 10

**SECTION-B**

- 4(a) In an LC circuit, a capacitor of capacitance C and an inductance coil of inductance L are connected through Morse key K. 20
- (i) How an LC circuit behaves as simple harmonic oscillator?
- (ii) Find the expression of Angular frequency, time period, frequency for an LC circuit.



- 5(a) The output of a rectifier consists of a d.c. component and an a.c. component. 20  
(i) Which rectifier contain more d.c. component than a.c.? Calculate it's efficiency.  
(ii) Describes the action of capacitor filter circuit.
- 5(b) In a transistor,  $\beta = 45$ , the voltage across  $5k\Omega$  resistance which is connected in the collector circuit is 5 volts. Find the base current. 10
- 6(a) Explain the terms population inversion and stimulated emission. 08
- 6(b) Derive an expression for magnifying power of a compound microscope. 15
- 6(c) A 5kW laser emits lights of 6mm wavelength. Calculate the number of photons emitted by the laser every second. 07